# ELECTRICAL TIMES

THURSDAY
11 JAN.
1951
SIXPENCE



B.I. Callenders

## PRESSED COPPER SERVICE BOXES

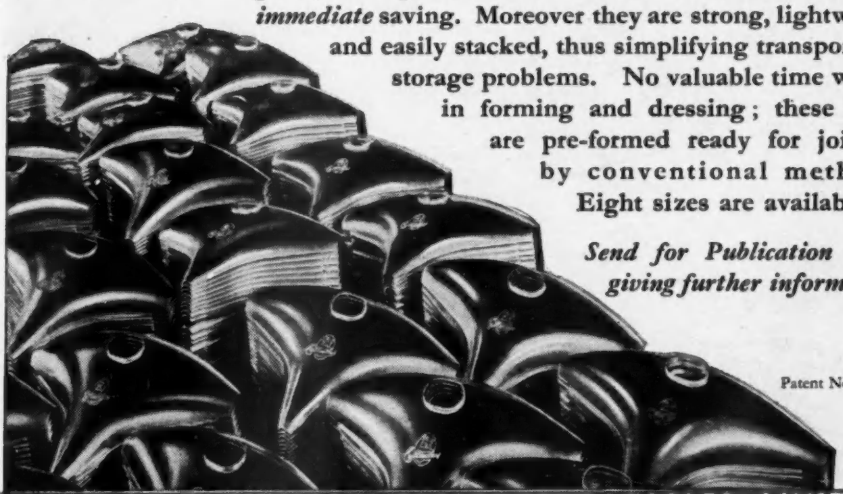
LIGHTWEIGHT

ECONOMICAL

READY FOR USE

**Consider the benefits obtained by using BICC Pressed Copper Service Boxes. With lead at its present high price, the purchase of COPPER boxes shows an *immediate* saving. Moreover they are strong, lightweight and easily stacked, thus simplifying transport and storage problems. No valuable time wasted in forming and dressing; these boxes are pre-formed ready for jointing by conventional methods. Eight sizes are available.**

***Send for Publication 211W. giving further information.***



Patent No. 614477

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

Yes! Ask her. Ask your customer what she looks for in a cooker—in addition to the meat ration! B.N.E. asked Supply Authorities serving one and a quarter million consumers what they wanted, and incorporated their requirements in the Model C.49. As a result the specification includes more desirable features than have ever before been built into one cooker, not the least of them being the very attractive appearance . . . . . Send for full details now.

- ★ CAST-IRON MAIN FRAME AND HOB.
- ★ CONFORMS TO B.S. 1195 AND E.D.A. SPECIFICATION FOR INTERCHANGEABILITY.
- ★ VERY LARGE OVEN AND HOT-CUPBOARD WITH DROP-DOWN COUNTERBALANCED DOORS.
- ★ HOB AND OVEN EQUIPMENT DESIGNED FOR RAPID REMOVAL AND CLEANING.
- ★ EASY CONVERSION FROM 2 TO 3 PLATE.

*The B.N.E. Model C.49*

*The Cooker that has everything*

**BRITISH NATIONAL ELECTRICS LTD.**

THE DOMESTIC APPLIANCES SECTION OF
JOHNSON & PHILLIPS LTD.
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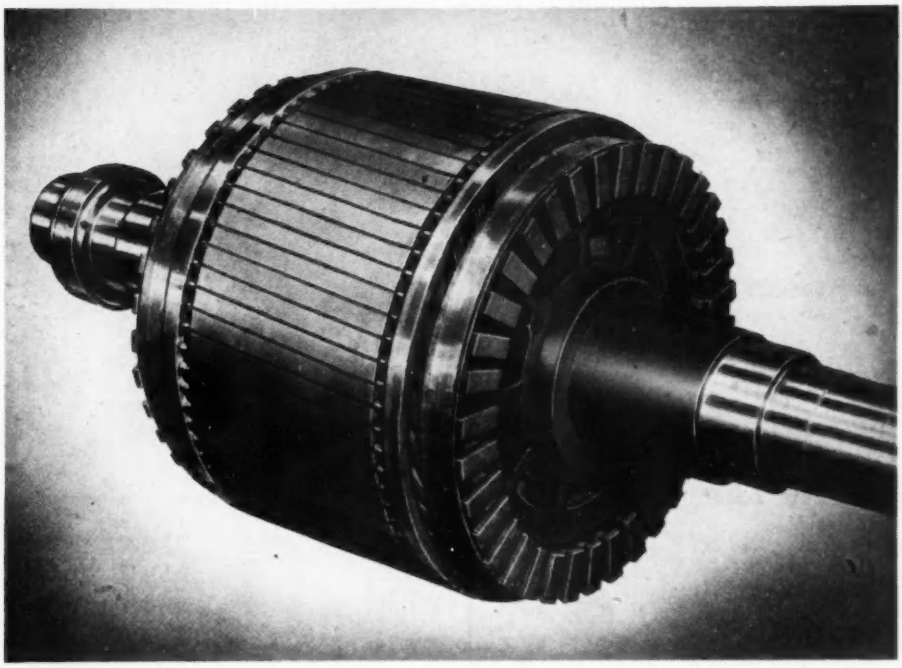

*A typical 'Trislot' rotor of medium-large size*

L.S.E.

**TRISLOT**

A squirrel cage motor of special design, giving a higher starting torque for a lower starting current than a standard squirrel cage machine, combined with high running efficiency.

Suitable for all high torque applications and for use in many instances instead of the more expensive slip-ring installation.

***One example of the comprehensive range of machines made by the specialists :***

# LAURENCE, SCOTT
## & ELECTROMOTORS LTD

NORWICH · MANCHESTER · LONDON & BRANCHES

A

**SMITHS**

***famous for***

***all time . . .***

***make the***

***finest***

***MASTER CLOCKS***

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***TIME RECORDERS***

Installations may be purchased outright or arranged on rental terms. Write to us for full details or call at our Showrooms for a practical demonstration.

**ENGLISH CLOCK SYSTEMS LTD**

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THE INDUSTRIAL BRANCH OF
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**FACEPLATE RHEOSTATIC ROTOR STARTER**

A starter of modern design for use in conjunction with slip ring motors not exceeding 15 h.p. limiting the starting current to 125/150% of full load, the motor exerting full load torque.

BROOK MOTORS Ltd. HUDDERSFIELD • ENGLAND
Makers of A.C. Electric Motors from 0·25 to 200 h.p.

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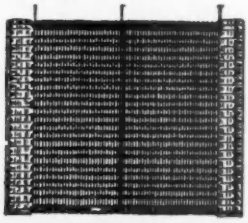
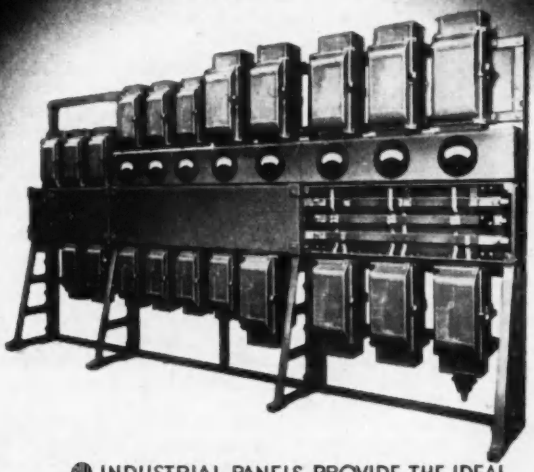
**WIRE RESISTANCE NETS**

Speedily supplied from stock, or 'made to measure' at a cost that will please you. Our Technical Service will help you with any problems.



**CRESSALL**

Registered Trade Name of—
The CRESSALL MANUFACTURING CO., LTD.
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines). Telegrams: OMHIC. BIRMINGHAM



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INDUSTRIAL PANELS ENSURE THAT ALL SECTIONS OF AN INSTALLATION ARE UNDER ONE MAIN CONTROL

A SPECIAL TECHNICAL STAFF WILL ASSIST WHERE NECESSARY AND TENDERS WILLINGLY SUPPLIED TO YOUR OWN SPECIFICATION

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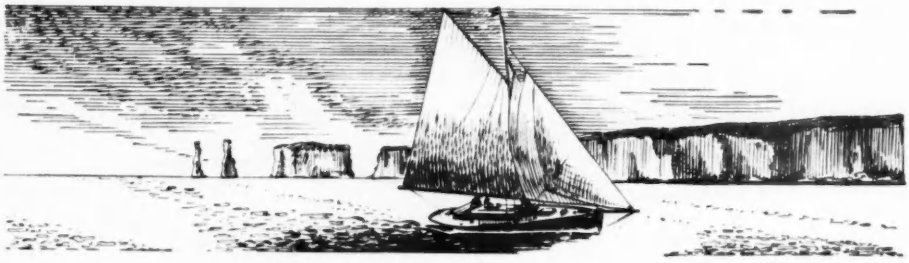


*The "Spray" off Old Harry Rock near Bournemouth*

# 1912 *The Story of* BELLING *& Company Ltd.* No. 21 1951

In the course of this series I have often been asked, "What's it all worth," and similar questions.

I think the greatest pleasure I have had has been to see this business and also the other businesses of which I am a Director continually expand. Also it is fine fun when your competitors get out something better than what you have yourself, and it keeps you busy for quite a few months trying to get out something better than their's—if you can. Also I always enjoy travelling and meeting our customers, although I don't do as much of this now as I used to in the early days.

Of course as far as the shareholding of Belling & Co. Ltd. is concerned, actually I hold the lot except for a few held by my secretary for legal purposes. What these shares happen to be worth is a question I seldom bother about. Anyway I take comparatively little cash out of the business, just sufficient salary for my small personal needs, so that most of the profits simply go back into bricks, plant and materials, thus making more work for still more people.

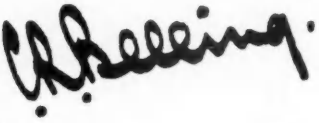
Then again one has some justification in feeling rather pleased to have originated such a business as Belling & Co., Ltd. (always remembering the financial help and moral support given to me by my original two partners.) The successful results of this Company have enabled me to join in with other Directors in starting the other businesses I have already mentioned, namely M.K. Electric Ltd., Wootton & Co., Ltd., Belling & Lee Ltd., Concrete Utilities Ltd., Insulators Ltd., Church & Co. (Essex) Ltd., Knightshades Ltd., Fairfarms Ltd., and Erecon Ltd.

All these Companies have been eminently successful due to the great efforts put into them by my co-Directors, who in these cases fully deserve the bulk of the credit for their expansion. We as Directors have fortunately worked marvellously well together which always goes a long way towards success. Some correspondents ask if I ever do anything else but work. Well, I have a game of golf occasionally, I used to do quite a lot of yachting, I was a regular visitor to Switzerland every Christmas for about 12 years for the Winter Sports, I sometimes do a bit of shooting on the farm, and then, perhaps, I have a go at fishing, but, as a matter of fact, I always soon get back again to the good old Works.

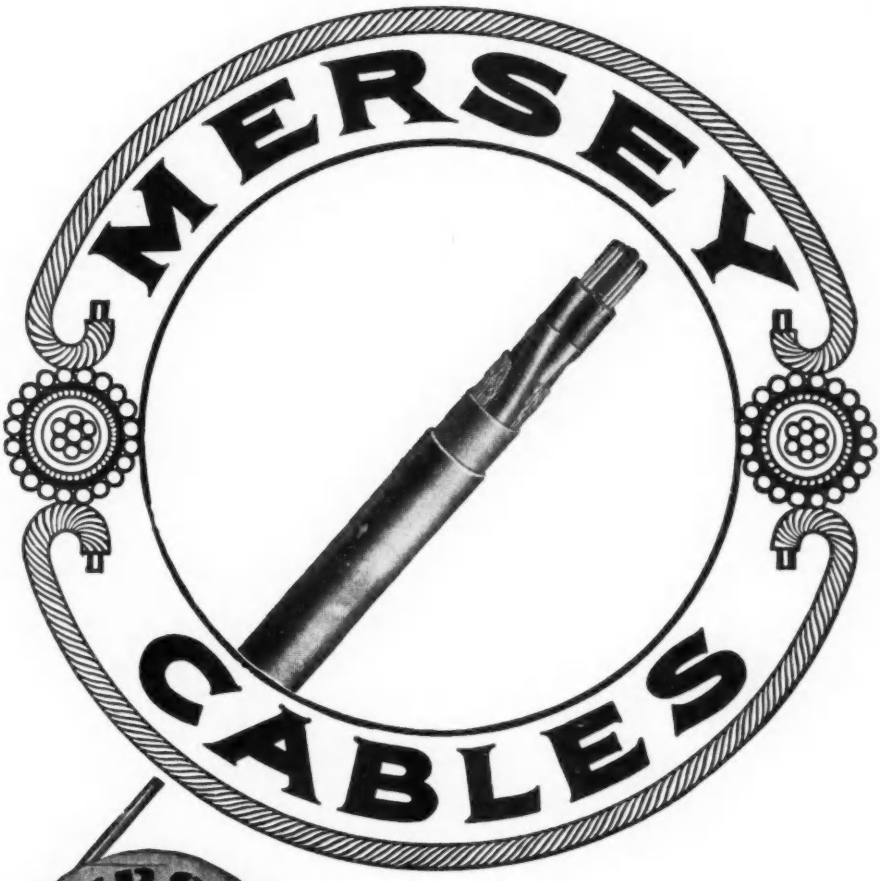
I am now nearly 67 and I have to admit there is nothing I can find more interesting to do than to go into our Experimental Department and join in with our staff there, fathoming out some new ideas. We have, as a matter of fact, two going through at the present time, and you will be hearing more about them later on.

Of course, the actual making of money is now, more or less, incidental; it was, however, my main urge when I first started in business. Talking about money, it does seem to me that I shall have to do something presently to meet the impact of death duties which we all have to face in due course. Some Public Issue, Holding Company or Amalgamation would seem to be eventually necessary, but just at the present moment I am busy trying to think out the very best plan which I can adopt to help those who have helped me in building up this business. This, I think, will perhaps, be one of the best uses that I can make of some of the assets which have accumulated.

Chapter No. 22 will be, I think, the last chapter for the time being, and will, I hope, be of equal interest to any of the previous ones, and more especially to those particularly concerned.



*Belling & Co., Ltd., Bridge Works, Enfield, Middx. Tel.: Howard 1212.*



**All Sizes** of rubber insulated wires, cables and flexibles are made under the famous MERSEY name. *Illustrated is a 7/.029 Three Core Circular V.I.R. Insulated, Taped, Lead Alloy Sheathed, 250 volt Grade Cable. To B.S. — No. 7/1946.*

**MERSEY CABLE WORKS LTD., BOOTLE, LIVERPOOL. *Tel. BOOTLE 2777-8-9***

***A COMPANY***

**A NEW** and comprehensive List of **SLIDING RESISTANCES** and **DIMMERS** is now available on application

THERE HE STANDS—symbol of authority in an orderly World—controlling—directing—obeyed because absolutely trustworthy and reliable.
What a fitting comparison with BIRCH RESISTANCES, *Arms of the Ohm's Law.*
Backed by many years of practical experience in which their reliability has been tested under all conditions, BIRCH RESISTANCES, in their various applications, stand up to their job and can always be depended upon to provide specified service because of their first-class workmanship.

**Birch**

*Registered Trade Mark*

*Please call upon us to help you solve any Resistance problem.*

# Resistances

May we quote you for any of the following :—

**DIMMERS—REGULATORS (Field, Shunt, Voltage)—RESISTANCES (Arc Lamp, Charging, Regulating, Sliding)—RHEOSTATS—ELEMENTS and SPIRALS—Asbestos Woven Resistance Nets and Grids.**

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Telegrams : "WILOHM," Willenhall. Telephone : Willenhall 494-495
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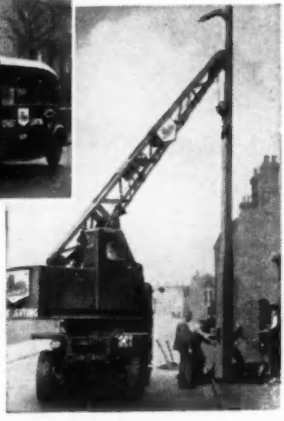
G97

# A comprehensive street lighting service . . .



(Top) Revo "Silverblue" lanterns mounted on Revo "Phidias" concrete columns at Altrincham.

(Centre and Bottom) Units of the Revo Street Lighting Erection Dept.

Revo

## STREET LIGHTING EQUIPMENT

The Revo factories constitute one of the largest organizations in this country for the manufacture of Street Lighting Equipment. Complete installations can be carried out, from the initial planning of the scheme to the final erection of the equipment, and a staff of skilled engineers, using the most modern apparatus, is available for this purpose.

**REVO ELECTRIC CO. LTD., TIPTON, STAFFS.**

**YOU'RE NEVER FAR**

*55, Washington St., Glasgow.*

*54a, Newton St., Manchester.*

**FROM BIG STOCKS OF**

**GENERAL CABLES**

*204, Newhall St., Birmingham.*

*Leatherhead, Surrey.*

Comprehensive stocks of General Cables are held at Leatherhead, Birmingham, Manchester and Glasgow. Deliveries can be made at short notice through your usual wholesaler.

*In case of difficulty write to*

**THE GENERAL CABLE MANUFACTURING CO. LTD.**
**LEATHERHEAD, SURREY.**

TELEPHONE: Leatherhead 3021 (4 lines)
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**"GOOD CABLES TODAY PREVENT TROUBLE TOMORROW"**

# For the years to come

EVERY FACTORY is the home of a business. It determines the efficiency of employees, the spirit in which work is done, the quality of all products. Each detail of its construction counts. Every care taken now in the building of a new factory will be repaid many times over in the years to come.

When Patons and Baldwins Limited planned the world's greatest knitting wool factory they took a wise step—like a hundred and sixty-six other firms before them they entrusted the building of their factory to John Laing & Son Limited.

And those who are now planning large scale construction will be wise to consult the firm whose immense capacity is proved by many great works completed every year: power stations, factories, steelworks, cement works, schools, hospitals . . .

**LAING**

**For speed and efficiency in building and civil engineering**

JOHN LAING AND SON LIMITED · *Established in* 1848

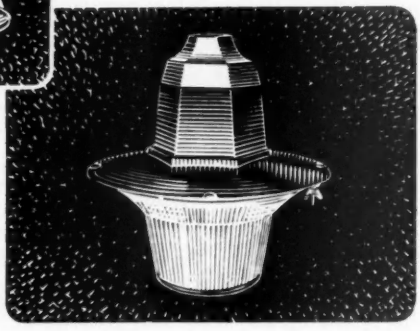
*London, Carlisle, Lusaka, Johannesburg*

ELECO

# SPECIALISTS IN *Modernised*

**INDUSTRIAL • COMMERCIAL • STREET LIGHTING**

Modern lighting is work for the specialist. That is why it pays to consult E.L.E.C.O. — the specialists with over 50 years' experience in the design and manufacture of all types of Industrial, Commercial and Street Lighting fittings.



*Street Lighting Fittings of outstanding design for all types of lamps; Tungsten; electric discharge; fluorescent lamps; industrial and commercial lighting fittings; vitreous enamelled reflectors of all types; cast iron, Watertight and Bulkhead fittings; street lighting columns; raising and lowering gear; switches.*

## ENGINEERING & LIGHTING EQUIPMENT CO. LTD.

**SPHERE WORKS • ST. ALBANS • HERTS**

Telephone : St. Albans 2258/9 Telegrams : VOLTARCON, St. Albans

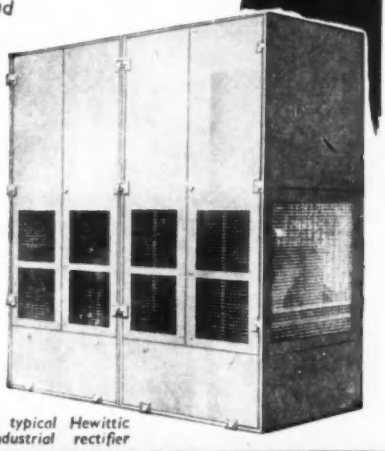
# The ENGINEER bases his choice on Facts

**Wherever D.C. is required from an A.C. Supply—the FACTS favour**

## Hewittic Rectifiers

REGD TRADE MARK

- Static—no moving parts except a ventilating fan—the simplest of all converting plant.
- Exceptional reliability based on simplicity.
- Require no attention: the ideal equipment for unattended sub-stations.
- Unit steel cubicle construction facilitates installation in awkward sites and existing buildings.
- Maintain high efficiency in service. Efficiency the same in ten years' time as when installed (which is not true of all types of rectifier).
- High efficiency maintained at light loads—maximum economy of operation on fluctuating demand.
- Manufactured in a range of types suitable for every application from electric traction supply to battery charging.
- Manufactured entirely in England in a modern works; developed through over 30 years of rectifier experience.



A typical Hewittic industrial rectifier

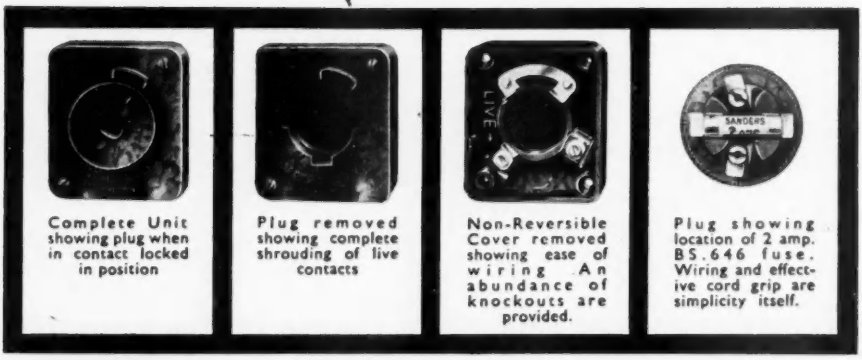
**OVER A MILLION kW. IN WORLD-WIDE SERVICE**

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

# SANDERS CLOCK 475,157 CONNECTORS

Where all these are used and who uses them is a question we are not competent to answer, but we do know that our Authorised Distributors require substantial stocks to meet the daily demand, Sanders Clock Connectors being called for almost exclusively. The reasons for their popularity are not far to seek, for the exclusive patented design combining such ease of wiring and functional efficiency within so neat and compact a compass, provides everything required in an accessory of this nature.

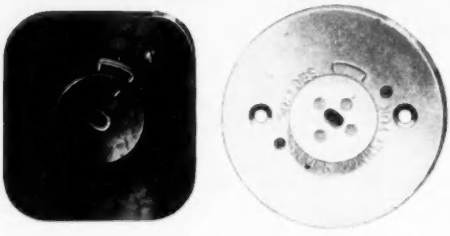


Complete Unit showing plug when in contact locked in position

Plug removed showing complete shrouding of live contacts

Non-Reversible Cover removed showing ease of wiring. An abundance of knockouts are provided.

Plug showing location of 2 amp. BS.646 fuse. Wiring and effective cord grip are simplicity itself.



Fused in the live side only for safety and to comply with the provisions of I.E.E. Regulation 111 and 1312B.

| *List No.* | *Description* | *Approximate Dimensions* | *List Price* |
|---|---|---|---|
| TA/OF 22 | Square, surface (Walnut) | 1⅞" x 2½" x ⅞" projection | per doz. *26/4 |
| KD/OF 22 | Square, flush (Walnut) | 2⅜" x 2⅜" x ¼" projection | *29/4 |
| BKD/OF 22 | Circular, sunk for use with standard BS.31 or BS.820 boxes (White) | 3⅛" diam. x ¼" projection | *32/– |

*Plus 110% advance

**SANDERS**
**WEDNESBURY**

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

# Whenever light is needed . . .

## The ELLIOTT LIGHTING CONTROLLER *switches on automatically*

*Photo by courtesy of Nottingham Corporation Lighting Committee*

Reliability and simplicity are the keynotes of the Elliott Lighting Control System, which switches on whenever low light values occur, not only at night, but also during daylight storms and fog. The system is particularly suitable for remote islands, crossings, etc., as it requires no routine maintenance or resetting. Operation is by means of a barrier-layer photocell and magnetic amplifier—no valves are employed.

The Elliott Lighting Controller has innumerable applications in industry, for factory lighting, harbour and dock lighting, railway yards, etc. Send for full details.

ELLIOTT AUTOMATIC LIGHTING CONTROLLER

ELLIOTT BROTHERS (LONDON) LTD., CENTURY WORKS, LEWISHAM, LONDON, S.E.13 • TIDeway 3232

# R·E·A·L

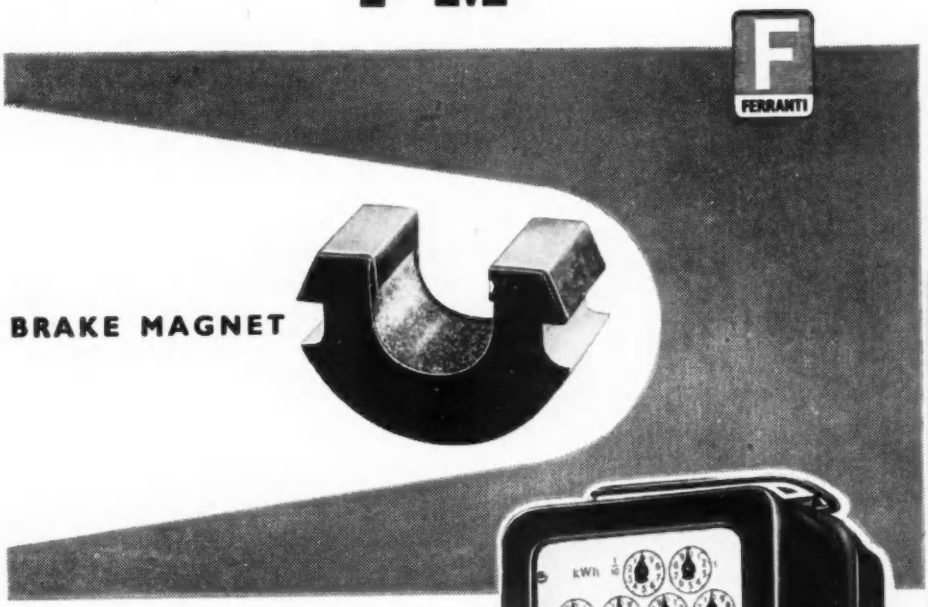
*Present their Range of Flood Lanterns for the Festival of Britain*

The 'Festival' model illustrated below is but one of the comprehensive range of R.E.A.L. flood lanterns which cover practically every flood lighting requirement.

*Copies of our new publication "R.E.A.L. Flood Lanterns" are now available.*

*Issued by* ROWLANDS ELECTRICAL ACCESSORIES LTD • R E.A.L. WORKS, BIRMINGHAM 18

# THE FM METER



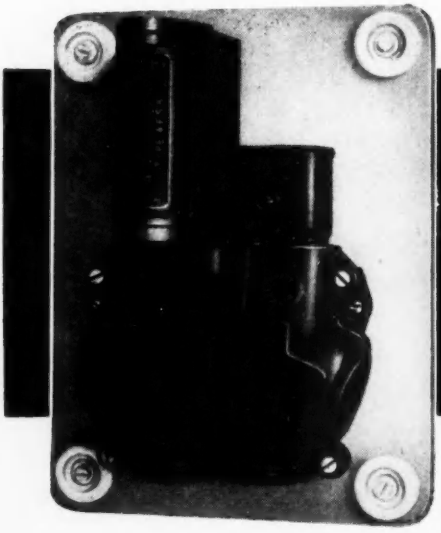

**The unequalled performance of the Ferranti F.M. Meter is largely due to an anisotropic magnet of unusual power having 14 times the magnetic energy of Tungsten steel and 4 times that of 35% Cobalt.**

## FERRANTI LTD.

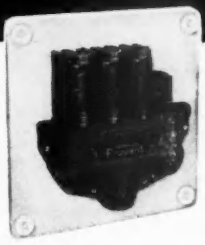
HOLLINWOOD · LANCASHIRE · ENGLAND

FM94

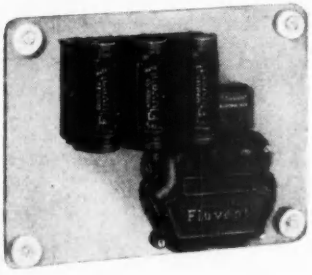
London Office: Kern House, Kingsway, W.C.2.



# ALL-INSULATED HOUSE SERVICE CUT-OUTS



The Standard - Aeroflex 60 amp. all-insulated House Service Cut Outs can now be supplied with fuse bridge equipped with the Aeroflex Ceram Type CSK fuse link, which complies not only with BS 88 Category 440 AC 4 but also with the dimensions given in BS 1361, affording interchangeability with other makes.




Aeroflex
HOPE'S PATENTS

*ABOVE: Aeroflex 60 amp. House Service Cut Out—Triple Pole and Neutral—for 4 wire services.*

*BELOW: Multiway form Single Pole and Neutral, using busbar type units coupled to the original fuse which is mounted in the sealing chamber.*

**PARMITER HOPE & SUGDEN LIMITED**
**FLUVENT ELECTRICAL WORKS, LONGSIGHT, MANCHESTER 12**
London: 34 Victoria Street, S.W. 1 Glasgow: 162 Buchanan Street, C. 1

dm PH 32

# Thousands like them

## in every industry

# Parkinson standard A.C. motors

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

# TUMBLER SWITCHCRAFT

If you want the best switches *and* the best value for money, you want MEM. Try a sample dozen and see for yourself. The designs are neat and robust. Every part is beautifully made because MEM make every part themselves—even the porcelains. Mass precision production is the reason for the excellent value.

***Send for List No. 302 for details of the range—one and two way, 5 amps 250 volts, surface and semi-recessed and flush mounting—also flush plates and wood and iron boxes.***

**Makers of Switch, fuse and motor control gear, electrical fires and localised lighting equipment.**

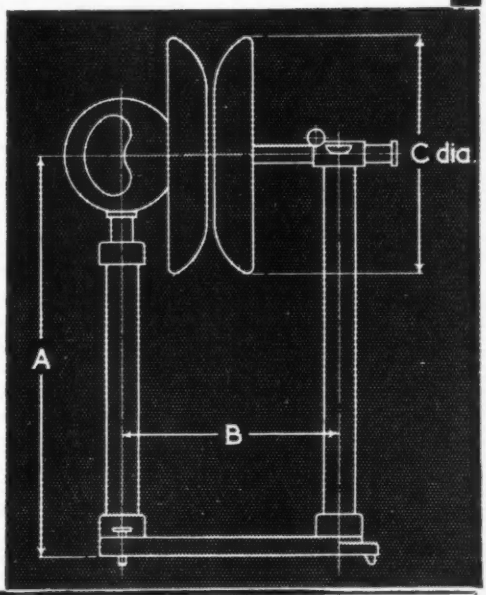
**MIDLAND ELECTRIC MANUFACTURING CO. LTD · TYSELEY · BIRMINGHAM, 11**

Branches in London and Manchester

# ELECTROSTATIC VOLTMETERS

*FOR HIGH VOLTAGES UP TO 500kV*

**Direct Reading •**
**Direct Connected •**
**A.C. or D.C. System**
**earthed or unearthed •**
**Transportable •**




CATALOGUE SHEET: Nº 153/E

| Model | Range | Dimensions (ins.) A | B | C |
|---|---|---|---|---|
| I | 3-10 kV. 3 ranges | 24⅞ | 12 | 10 |
| II | 5-60 kV. 3 ranges | 24⅞ | 12 | 10 |
| III | 5-120 kV. 4 ranges | 39¼ | 19½ | 18 |
| IV | 7·5-200 kV. 4 ranges | 39¼ | 25¼ | 20 |
| V | 10-300 kV. 4 ranges | 77 | 46 | 30 |
| VI | 30-500 kV. 3 ranges | Subject to conditions of use. | | |

**EVERETT EDGCUMBE**

*Makers of electrical instruments for indicating, recording and controlling; photometric apparatus; process controls.*

**COLINDALE WORKS, LONDON, N.W.9. TEL: COLINDALE 6045**

DHB

# The "ROSSLOW"

*Electric Wash Boiling Tub and Sink Unit 4 kw.*

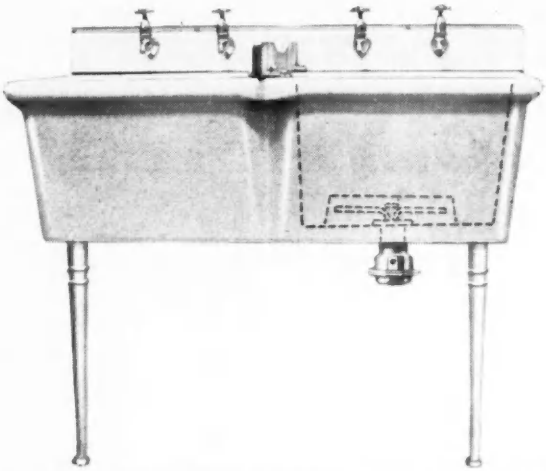
Patents Nos. 587316 and 428152

White enamelled fireclay complete with taps, drain and traps.

Saves space—no separate wash boiler required.

Easy filling and draining.

Convenience — clothes are passed through wringer from boiling tub to rinsing tub.

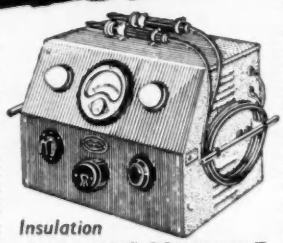


# DUNCAN LOW Ltd.

290 BELL STREET GLASGOW C.4

*Telephone:* Bell 1961-2 *'Grams:* "Immerser Glasgow"

*Flash Testing up-to-date*



*Insulation*
**FLASH TEST EQUIPMENT**
with "VARIAC" Control
Booklet on request

*It's a ZENITH product!*

**The ZENITH ELECTRIC Co. Ltd.**

Sole Makers of the well-known "Zenith" Electrical products
Zenith Works, Villiers Rd., Willesden Green, London, N.W.2
Phone: Willesden 4087-8-9 Grams: Voltaohm, Phone, London

**MOULDED RUBBER**

**in these ELECTRICAL TIMES**

moulded rubber components in natural or synthetic compounds, tested under most arduous conditions . . .

NONE BETTER THAN

*Dainite*

THE HARBORO' RUBBER CO. LTD.
MARKET HARBOROUGH

# MUTAC

## The *Silent* A.C. SWITCH

The original and universally popular silent switch for A.C. mains. The MUTAC range now consists of Surface, Semi-recessed and Flush types in 5 and 15-amp sizes and Ceiling mounting type in 5-amp size. Write for Publication S. 784 for full information.

**MUTAC** *Silent* A.C. **SWITCHES** *by* **G.E.C.**

*(Regd. Trade Mark)*

FOR USE ON A.C. ONLY

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

# Opening of the New House of Commons by their Majesties the King and Queen

IN WESTMINSTER HALL

Photograph by courtesy of The Times

TRANSLUCENT REFLECTORS by

HOLOPHANE LTD

SCIENTIFIC LIGHTING ENGINEERS

ELVERTON STREET, LONDON, S.W.1. VICtoria 8062 (4 lines)

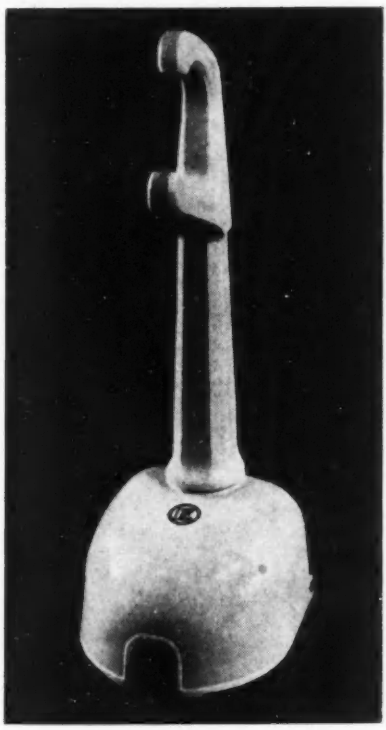
# 'ENGLISH ELECTRIC'

## hand-driers

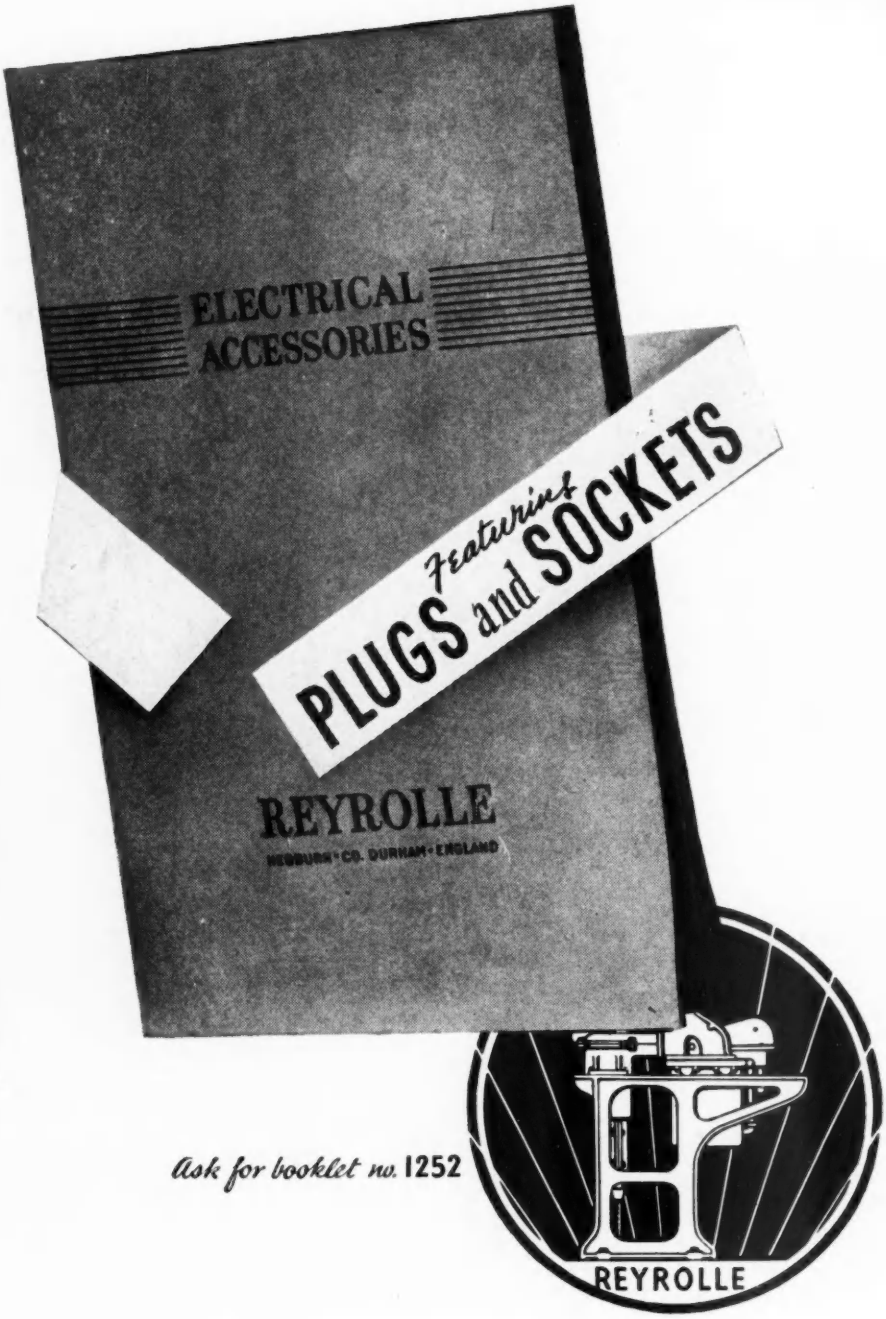
### Safeguard health · Cut laundry costs

Communal washrooms have, too often, a built-in health hazard—the communal towel. Quickly collecting and passing on germs from one user to the next, it collects water even faster and soon its soggy folds are more hindrance than help.

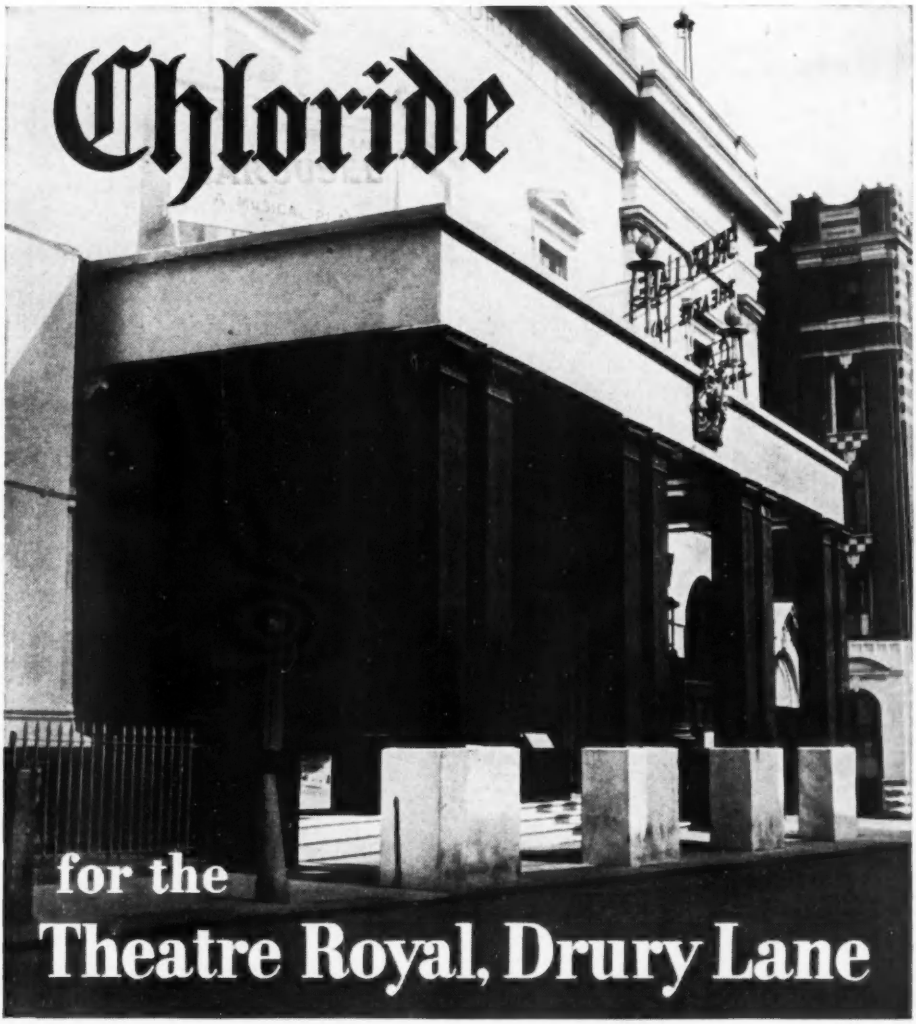
Warm air is unquestionably the most hygienic, pleasant and efficient communal hand-drier, reaching effectively the smallest skin-crevice where towels leave moisture to chap the hands. The new 'English Electric' Hand-Drier is a re-styled and improved version of the model already extensively used with complete reliability in factories, hotels and schools—foot controlled, powered by one of the range of 'English Electric' fractional horse power motors. It is built for rough use, and is completely safe; motor and heater run only when the pedal switch is depressed.



THE ENGLISH ELECTRIC COMPANY LIMITED
QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
F. H. P. Motor Department, Bradford
Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL




*Ask for booklet no.* **1252**




This famous theatre has just made certain of another 'long run.' For a Chloride Battery has been chosen to provide current for the emergency lighting circuit. The battery, of 110 DBG4 cells, has a capacity of 120 ampere-hours at the 10-hour rate of discharge, and will maintain a load of 6.3 kW for 3 hours.

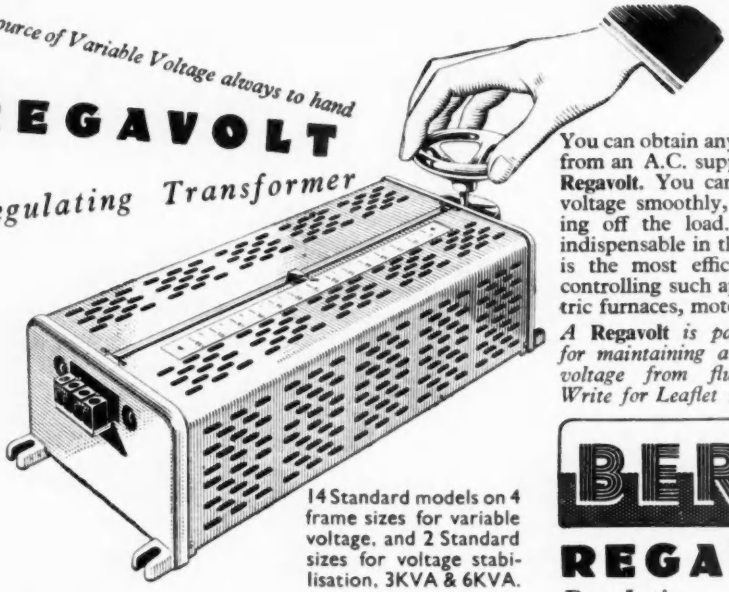
A PRODUCT OF CHLORIDE BATTERIES LIMITED
77 King Street, Manchester, 2, and 137 Victoria Street, London, SW1
**MAKERS OF EXIDE BATTERIES**

S.44

*A source of Variable Voltage always to hand*

**REGAVOLT**

*Regulating Transformer*



14 Standard models on 4 frame sizes for variable voltage, and 2 Standard sizes for voltage stabilisation, 3KVA & 6KVA.

You can obtain any voltage you like from an A.C. supply with a **Berco Regavolt.** You can also adjust the voltage smoothly, without switching off the load. A **Regavolt** is indispensable in the test room and is the most efficient method of controlling such apparatus as electric furnaces, motors, and lamps.

*A* **Regavolt** *is particularly useful for maintaining a constant supply voltage from fluctuating mains. Write for Leaflet* 3072/6.

**BERCO**

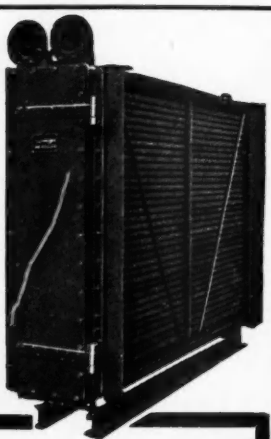
**REGAVOLT**

*Regulating Transformer*

THE BRITISH ELECTRIC RESISTANCE CO. LTD.
Queensway, Ponders End, Middlesex. Telephone: Howard 1492. Telegrams: Vitrohm, Enfield

BR3072/6 HI

**CLOSED CIRCUIT AIR COOLERS**



have already been installed in such SUPER POWER STATIONS as Hams Hall, Nechells, Deptford, Poplar, Johannesburg, Adelaide, as well as numerous large and small power stations. They are of tubular construction with no normal connection with the outside atmosphere.

THE
PREMIER COOLER & ENGINEERING CO., LTD.
Shalford Nr. Guildford Surrey.

**PROTECTAFIL**

*BRITAIN'S BEST*

**SHOCK ABSORBER**

**TREBLES LAMP LIFE**

Allows free swinging movement with floating balance

**6/9** each

Highly recommended for fluorescent fittings

*SEND FOR LIST*

*THOUSANDS NOW IN USE*

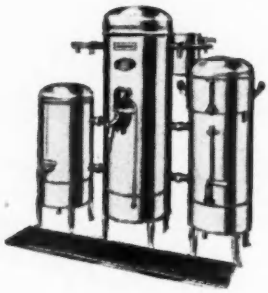
**J. E. WILDBORE LTD.**

**PETER STREET, OLDHAM, LANCS.**

*Telephone: MAin 4475*

43 YEARS LIGHTING SERVICE

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



# It is cheaper in the end

It's just sound sense to buy the best you can afford—for the best lasts longer, keeps its good appearance longer, works and wears better, costs less the while—and so is cheaper in the end.

The prudent buyer of tea and coffee brewing equipment knows that of course. That is why he instinctively turns to 'Jackson' equipment knowing for certain that he will get pre-eminent quality, proved reliability, guaranteed efficiency—equipment that will long outlast cheaper boilers and yet remain constantly efficient.

More to begin with (for quality must be paid for), a 'Jackson' is in every respect cheaper in the end.

**Note: For most types, immediate despatch can be promised.**

We are exhibiting at the HOTEL & CATERING EXHIBITION, City Hall, Manchester (Jan. 31st—Feb. 10th), Stand No. 72.

## Jackson Boilers Ltd.

TEL. 31088 **Shafton Lane Leeds 11** TEL. 31088

*—famed for their instantaneous water boilers*

*London Showrooms:* 25 Victoria Street, Abbey Orchard Street, Westminster, S.W.1.

*Scottish Showrooms:* 219 West George Street, Glasgow, and at Birmingham, Manchester, etc.

B T-H

# Switchgear for Industrial Service

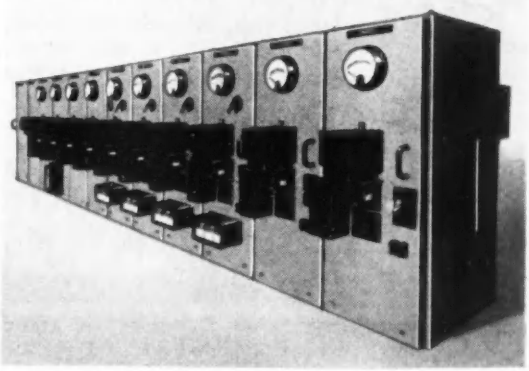
**Unit construction to facilitate erection and extension**

Above : Composite switchboard of Class AG1 and AG2 air-break equipments installed in the Reid N.Z. Rubber Mills to the order of the National Electrical and Engineering Co., Ltd., New Zealand.

Right : Class AJ21 air-break switchboard supplied to the order of Messrs. Spearing & Co., Ltd., for the Iraq Petroleum Company.

Ratings :—

Class AG up to 25MVA., 660 volts
„ AJ „ „ 35MVA., 660 volts



BTH manufactures all types of switchgear.

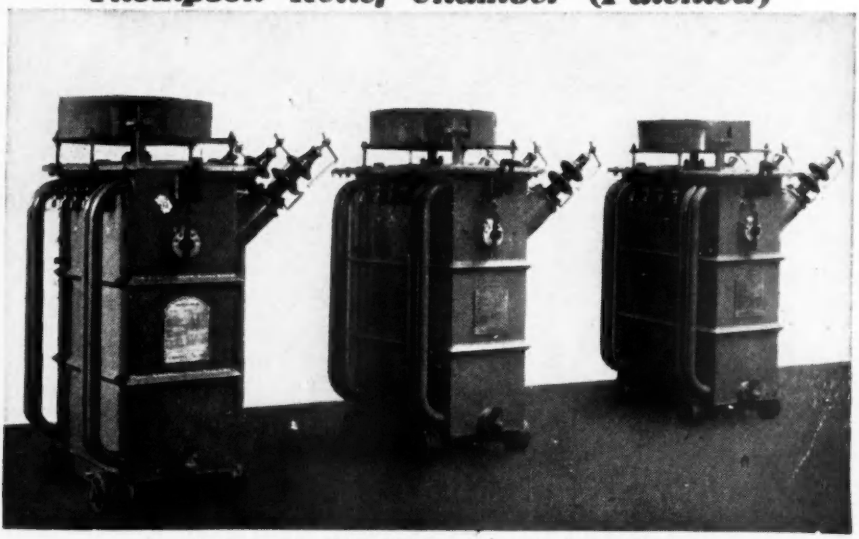
**BRITISH THOMSON-HOUSTON**

THE BRITISH THOMSON-HOUSTON CO., LTD., WILLESDEN, ENGLAND

AJ903

# HERMETICALLY SEALED!

***Thompson Relief Chamber (Patented)***



*Part of a Contract for 72-100 KVA Transformers for Southern Rhodesia.*

***Designed to give***

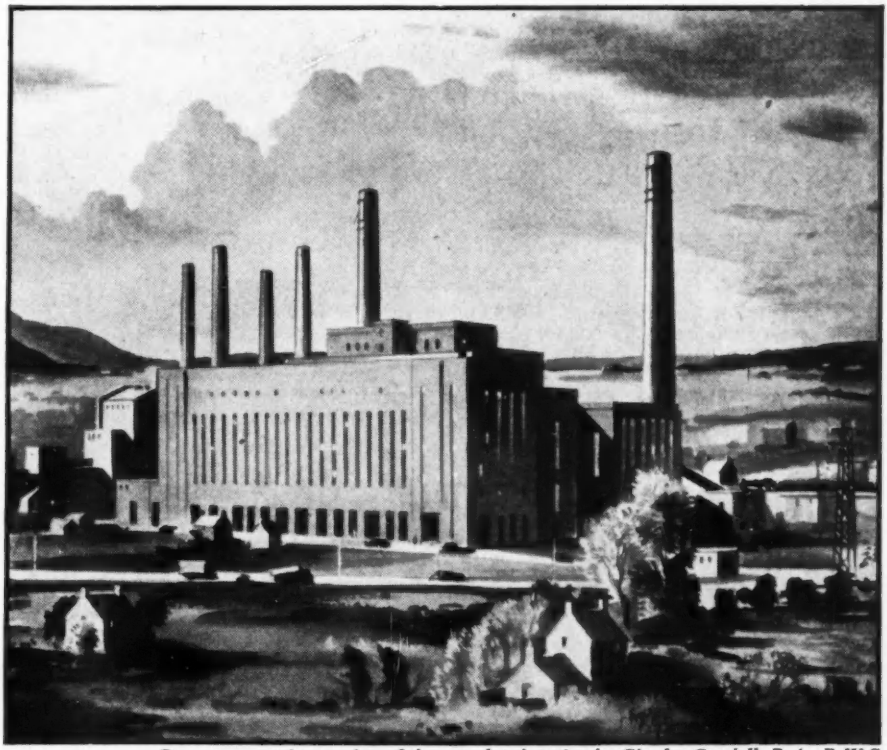
**trouble-free service under damp and humid conditions, this type of unit is operating perfectly in India, East and West Africa, Malaya, Ceylon, etc.**

**NO MOISTURE or ACIDITY of OIL**
**NO SLUDGING of OIL**
**NO SERVICE COSTS**

STANDARD TRANSFORMERS UP TO 2,000 KVA ALSO SUPPLIED

***Apply for Brochure to—***

**THE LINDLEY THOMPSON**
**TRANSFORMER & SERVICE CO. LTD**
**ST. MARY'S ROAD, SLOUGH, BUCKS.**
**LANGLEY (BUCKS) 200-201**



*Stourport—an impression of the completed station by Charles Cundall, R.A., R.W.S.*

# Another New Power Station

AT STOURPORT-ON-SEVERN, Worcestershire, stands the fifth of British Electricity's great post-war power plants. Stourport, when completed, will contribute 120,000 kW of much-needed electricity—equal to over 160,000 h.p.—to the national Grid.

**Steam at Red Heat**

Most of the turbo-alternators being installed in British Electricity's new power stations are of two standard sizes—30,000 and 60,000 kW. The Stourport sets are designed for 60,000 kW. Stourport is using steam at the exceptional pressure of 1,500 lb—two-thirds of a ton—per sq in, and at a temperature of 1,050° F—a visible red heat.

Stourport is only *one* of 38 new power stations being built by British Electricity; while 43 existing stations are being extended to give more power. This is part of British Electricity's plan to overtake the power shortage and to meet the ever-increasing demand for electricity, which has more than doubled in the last ten years.

**more power** FROM STOURPORT **means more**

BRITISH ELECTRICITY **power to the nation**

# IT COILS ITSELF!

The introduction of Closely Coiled T.R.S. Flexible Cord marks an important development in cables for portable apparatus. Constructed in the form of a close helix, it may be extended until nearly straight; when released, it snaps back into a neat coil without mechanical aid. No trailing. No kinking. Now available for "Walkie-Talkie" apparatus, hand lamps, drills, vacuum cleaners, irons, etc. Please ask for full information.

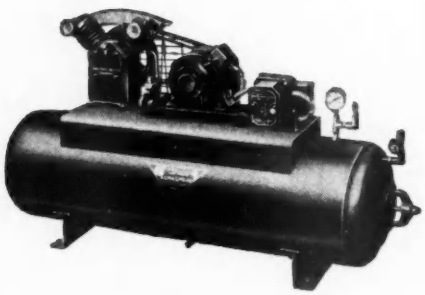
**St HELENS** EXTENSIBLE T.R.S. FLEXIBLE CORD

ST. HELENS CABLE & RUBBER CO. LTD., SLOUGH. SLOUGH 20333

# AERASPRAY TRADE MARK Air Compressors

Saving of floor space and speed and ease of installation are good reasons for choosing a Receiver Mounted Compressing Set. They are made with piston displacements up to 35 cu. ft. min. and auto-stop-start or any other form of control. The unit illustrated is typical of the range. High standards of precision and the finest materials available to the modern engineering world enable us to give Ten Years Guarantee; efficient organisation and moderate profit are reflected in competitive first cost. No less interesting is the Aeraspray range of larger machines.

***Write for information literature EL. 151***

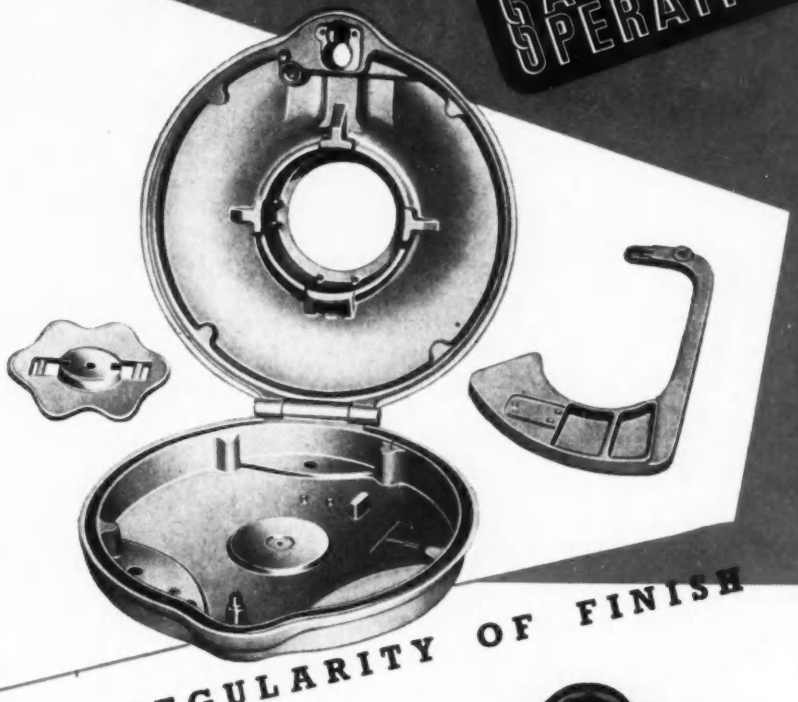


**AERASPRAY MANUFACTURING CO. LD.**

*Makers of Spray Guns, Single & Multi-Stage Air Compressors, Fume Exhaust Systems, Automatic Spray Finishing Systems.*

Head Works & Offices: Nechells, Birmingham 7; 1 Victoria St. London, S.W.1. Also at Glasgow, Manchester, Belfast, etc.

CASTING OPERATION



FOR REGULARITY OF FINISH

The illustration shows pressure die cast components for Servis Recorders. Our customer says, "We have been using your aluminium pressure castings for upwards of twenty years and we have found nothing to surpass them in regularity of finish. Our instruments are in use in all parts of the world and we have never yet had a single complaint regarding the parts you make for us. We have also come to appreciate and to rely on your Drawing Office and Design Staff, who have always been most helpful in the development of new types, and we look forward to continuing our co-operation with you for many years to come."

*Extract from letter received from Servis Recorders, Gloucester.*

**BIRMINGHAM ALUMINIUM CASTING (1903) CO LTD**
**BIRMID WORKS · SMETHWICK · BIRMINGHAM 40**

# INTRODUCING THE

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

**BIG in size and performance—yet fits British kitchens**

**Oven half as large again as most cooker's**

**Drop-down oven door—automatic interior light**

**Separately heated plate warming drawer**

**Spacious grill**

**Built-in cupboard space**

**Switch panel at handy working height**

**Full automatic control of oven and all boiling plates**

## FOUR MODELS TO CHOOSE FROM

**HOME MODEL**

Three 8" solid or radiant-type boiling plates—all interchangeable according to EDA specifications—and all controlled by Simmerstats

**HOME MODEL**

can also be supplied without the built-in storage cupboard

**EXPORT MODEL**

This cooker has three 8" boiling plates and an additional 6½" boiling plate of solid or radiant pattern. All controlled by Simmerstats. Export model also available on legs

# Creda comet

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

MADE BY THE HOUSE OF Simplex

SIMPLEX ELECTRIC CO. OLDBURY BIRMINGHAM AND BRANCHES

A TI COMPANY

## DUAL PURPOSE GRILL - FRYPAN

The PYRAMID dual purpose Grill-Frypan fits any standard post-war grill. With wire grid it is an efficient and enduring grill pan; the PYRAMID special construction makes it an admirable frypan. Thus one pan does the work of two. Wide corners for easy cleaning; insulated Bakelite heat-resisting handle. Another example of PYRAMID setting the standard.

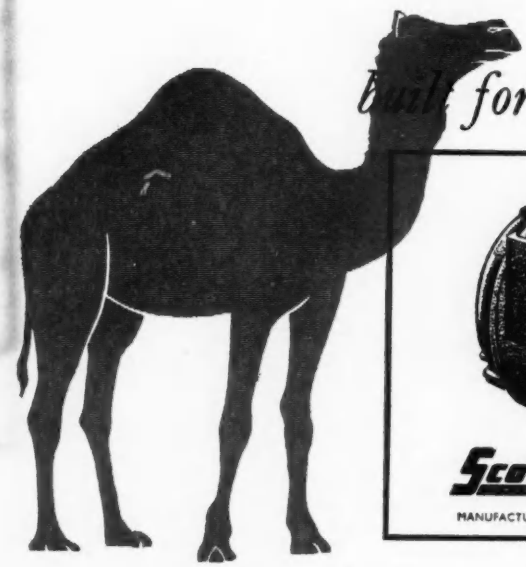
*No. 161 Grill Pan with handle on wide end.* *No. 160 Grill Pan with handle on narrow end.*

PYRAMID

**ALUMINIUM WARE FOR ELECTRIC COOKING**

**HAGUE & McKENZIE LTD. - PYRAMID WORKS - BIRMINGHAM 1**

4110G



*built for endurance*

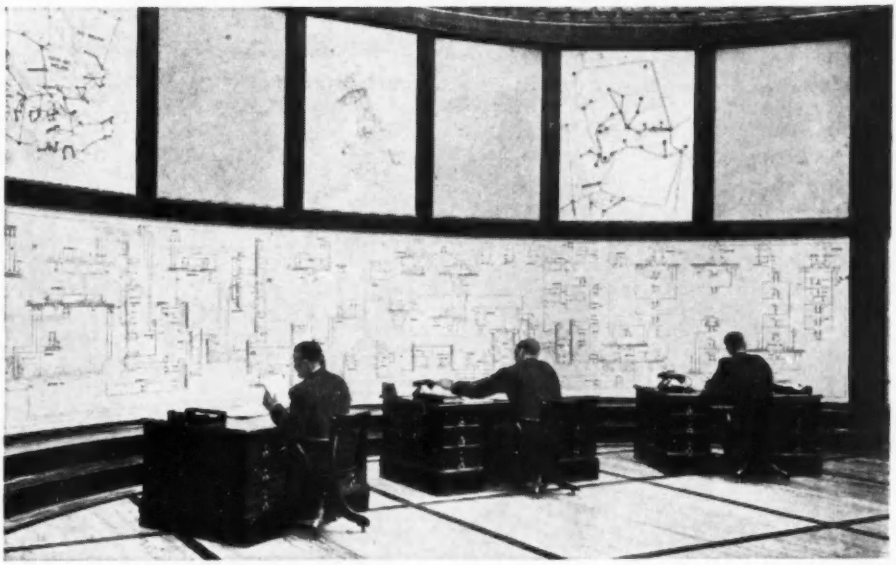
Scott

MANUFACTURERS OF A.C. AND D.C. MOTORS AND GENERATORS

**HUGH J. SCOTT & CO. (BELFAST) LTD · VOLT WORKS · BELFAST · NORTHERN IRELAND**

(11)

# Visual indication of vital information



Constant visual indication provided by A.T.M. Supervisory Remote Indication and Control Equipment gives the controlling engineer all the information necessary for the supervision and operation of the entire plant in a network.

Distances over which the equipment will operate are practically without limit. Many different conditions may be controlled and indicated over a single pair of wires.

*May we send you further information?*

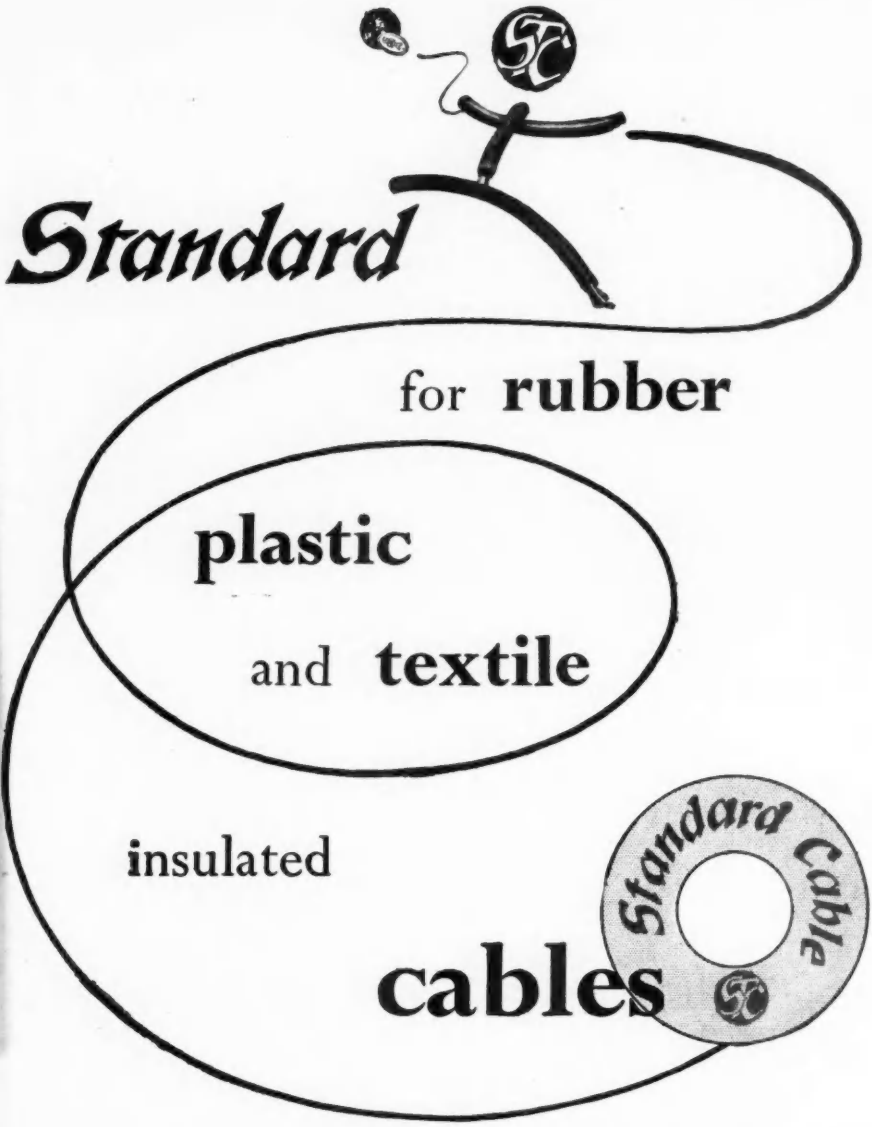
**Some of the facilities provided for the controlling engineer in an Electricity Supply Undertaking equipped with A.T.M. Remote Control Equipment include: starting and stopping of machines, closing and tripping of circuit breakers, raising or lowering of voltages by transformer tap change gear, inter-tripping of circuit breakers in grid networks, warning signals of fault conditions in unattended local sub-stations, telemetering (for total station load, busbar, volt and feeder amps), etc.**

ATM REGD TRADE MARK

**supervisory remote indication and control equipment**

**AUTOMATIC TELEPHONE & ELECTRIC CO. LIMITED**
Strowger House, Arundel St., London, W.C.2. *Telephone:* TEMple Bar 4506.
*Telegrams:* Strowger Estrand London. Strowger Works, Liverpool 7.

A.4241-C23



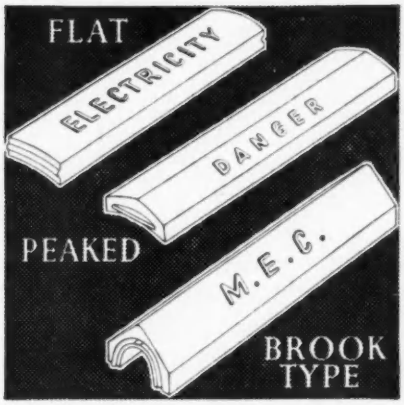

*Standard Telephones and Cables Limited*

(Registered Office: Connaught House, Aldwych, London W.C.2)

NEWPORT CABLES DIVISION · 10 Essex Street, London W.C.2 · TEMple Bar 0201
WORKS · Corporation Road, Newport, Monmouthshire · Newport 71381

REPRESENTATIVES AND WAREHOUSES: Birmingham, Bristol, Dublin, Glasgow, London, Leeds, Liverpool, Manchester, Newcastle, Newport, Nottingham, Belfast (A. W. Gordon, Agent).

# CABLE COVERS



**VINCULUM CONCRETE Cable Covers. Easy to lay but difficult to displace. The ends are shaped concave and convex and are joggled in thickness. The joint interlocks and prevents lateral and vertical displacement. Stock markings are Electricity and Danger, other marks to order. Thoroughly reinforced with main and cross bars, or to B.E.A. Specification.**

| TYPE | SIZE | NO. PER TON |
|---|---|---|
| Flat | 36″×12″ ×2″ | 30 |
| ,, | ,, 11″ ,, | 32 |
| ,, | ,, 10″ ,, | 35 |
| ,, | ,, 9″ ,, | 40 |
| ,, | ,, 8″ ,, | 45 |
| ,, | ,, 7″ ,, | 50 |
| ,, | ,, 6″ ,, | 60 |
| ,, | 18″× 6″ ,, | 120 |
| Peaked | 36″×12″ ×2½″ to 1½″ | 30 |
| ,, | ,, 11″ ,, ,, | 32 |
| ,, | ,, 10″ ,, ,, | 35 |
| ,, | ,, 9″ ,, ,, | 40 |
| ,, | ,, 8″ ,, ,, | 45 |
| ,, | ,, 7″ ,, ,, | 50 |
| ,, | ,, 6″ ,, ,, | 60 |
| ,, | 18″× 6″ ×2″ to 1″ | 160 |
| ,, | 18″× 4½″ ,, ,, | 200 |

*Brook Type are made in three sizes for cables up to 1⅝″, 2¼″, and 3″ diameter. Radius Units are made to work with all three sizes.*

Other Units for the Electrical Engineer include Joint Coffins, Tee-Service and Couplings Boxes, Cable Posts, Pole Splints, Ducts and Covers, Valve Chambers, etc. Paving Flags and Road Kerb, Fencing for every purpose, Walling Blocks, Floors & Roofs. Sectional and pre-fabricated hutting, Tunnel Units, etc.

**Quotations by return of post for any quantity. Immediate deliveries by road alongside trenches to suit daily requirements, or by rail to nearest station.**

*Head and Registered Office*

## TARMAC LIMITED, VINCULUM DEPT., ETTINGSHALL, WOLVERHAMPTON.

Telephone: Bilston 41101-8

Kill rot in standing poles—by

**Cobra** re-impregnation

The fall of a transmission pole through hidden decay can disrupt your service, lead perhaps to a serious accident. Why take this risk when now you can ensure against it with the Cobra deep-injection process of re-impregnation?

Applied without taking the pole from the ground, Cobra treatment sends a special preservative right to the innermost fibres of the timber. It permanently halts rot. Cobra-treated poles are guaranteed against further decay.

The Cobra Service includes pole inspection and individual condition reports. Full information on request.

**COBRA (WOOD TREATMENT) LTD.**, 37 MANCHESTER STREET, LONDON, W.1. *Telephone: WELbeck 1395*

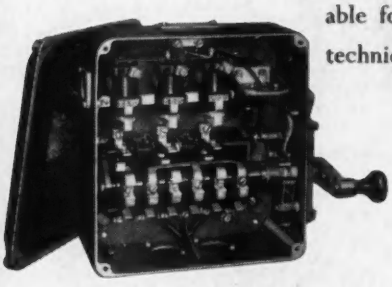
*Affiliated Companies in France, Belgium, Italy, Holland, Spain, Switzerland, Canada and U.S.A.*

A.3069

# *When an air-break star-delta starter is better . . .*

## *. . . a METROVICK ASD is best*

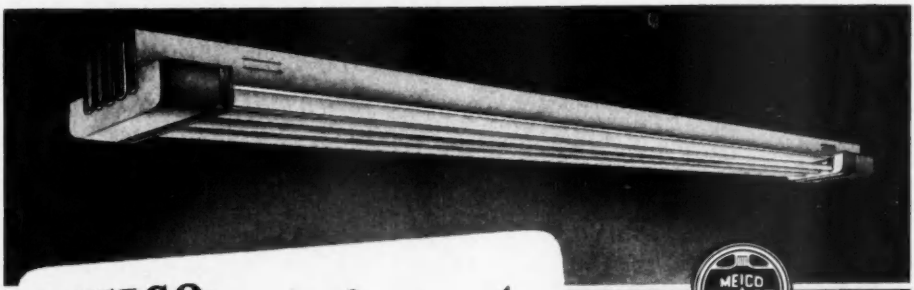
The ASD series of Metrovick starters is not only made to B.S. 587 but to the standard of design and construction which Metrovick rigorously maintain in all their products. The ASD starter is available for immediate delivery and invites close inspection. Full technical details will be sent on request.



*Type ASD starters are suitable for squirrel-cage motors up to 25 H.P., 650 V. The starters are intended for use in general industrial applications.*

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED TRAFFORD PARK, MANCHESTER, 17

**METROVICK** *Control Gear for all Motor Drives*



# MEICO *Cold Cathode* LUMINAIRES

Meico Cold Cathode Units establishes a special place in the field of lighting, due to their high efficiency and adaptability with considerably longer life, instant starting and their ability to operate on reduced supply voltage. Available in a variety of colours and combinations in "U" Tubes, 3 ft. Grid and Straight Tubes. The services of our lighting engineers are at your disposal to assist in the preparing of lighting schemes, without obligation.

MEICO

## MICRAMATIC LIMITED

WOOTON MOUNT
OLD CHRISTCHURCH ROAD
BOURNEMOUTH

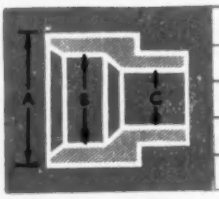
WORKS
CONGLETON CHESHIRE

---

CRITCHLEY

# *Interlocking* CABLE END FERRULES

The Critchley Interlocking Ferrule is a simple, speedy and economical solution to the problem of identifying cable ends in electrical equipment which demands a wide range of markings.




| STANDARD SIZES | | | |
|---|---|---|---|
| SIZE | A | B | C |
| 1 | ·275" | 3/16" | 3/32" |
| 2 | ·354" | 1/4" | 9/64" |
| 3 | ·406" | 5/16" | 9/64" |

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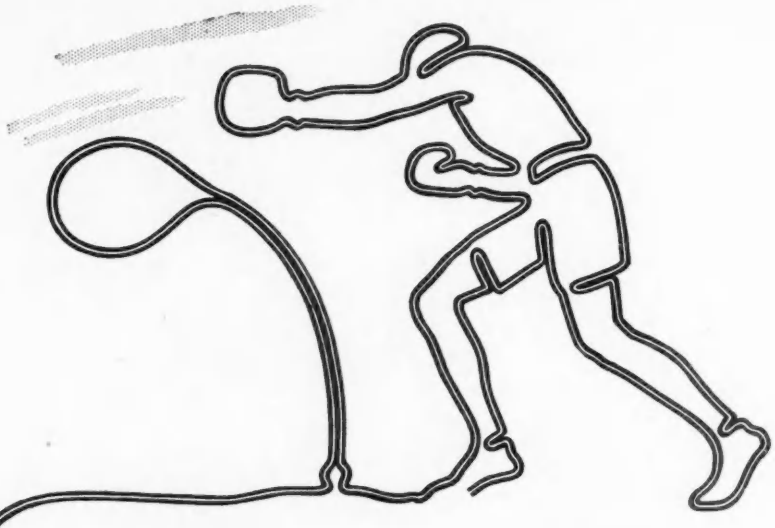

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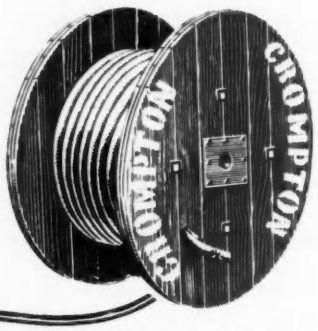


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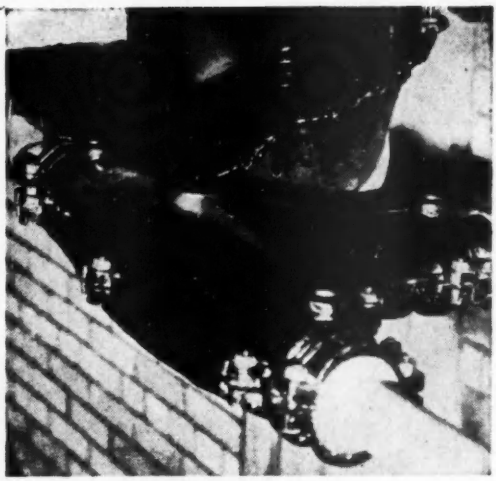

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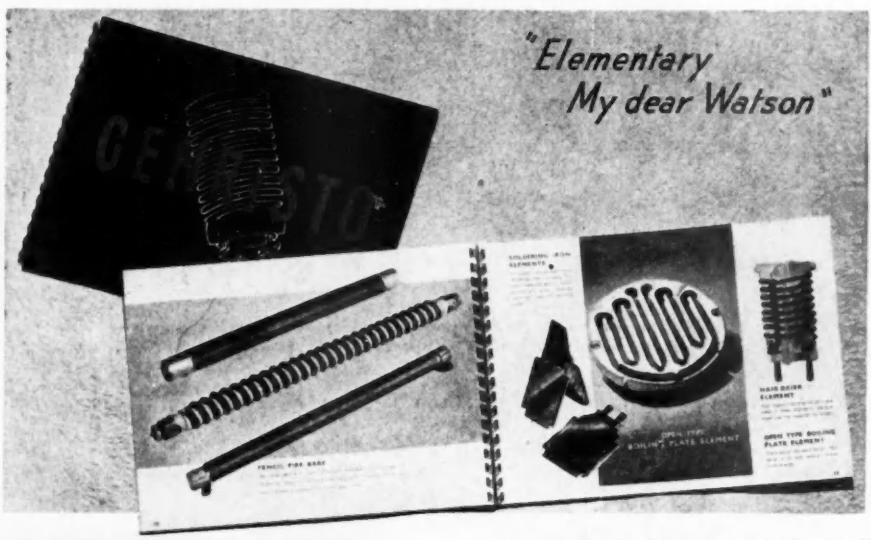


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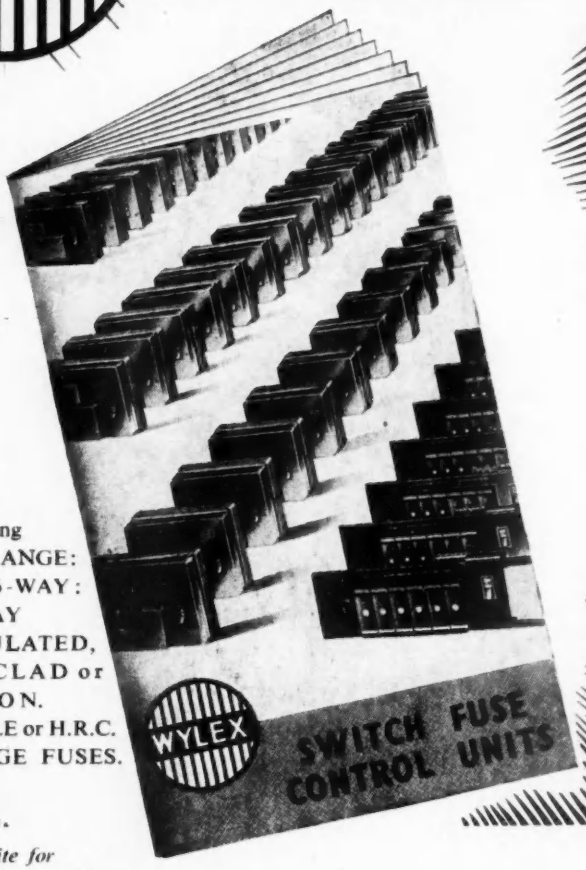


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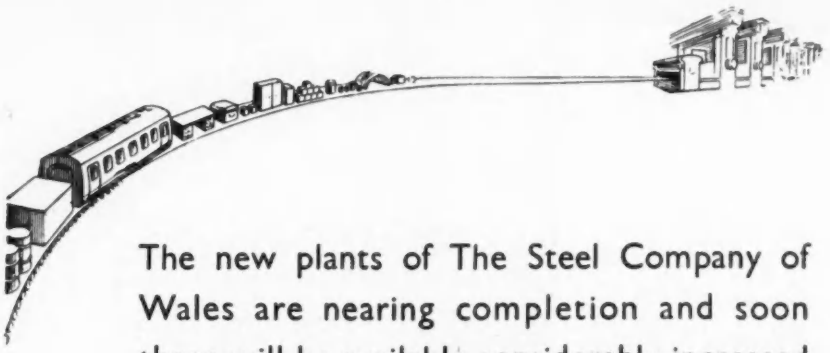

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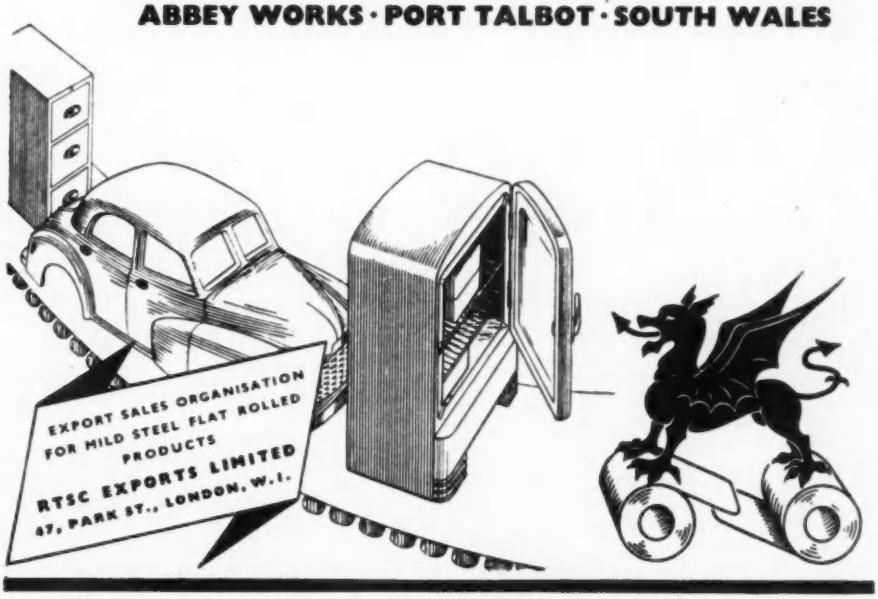

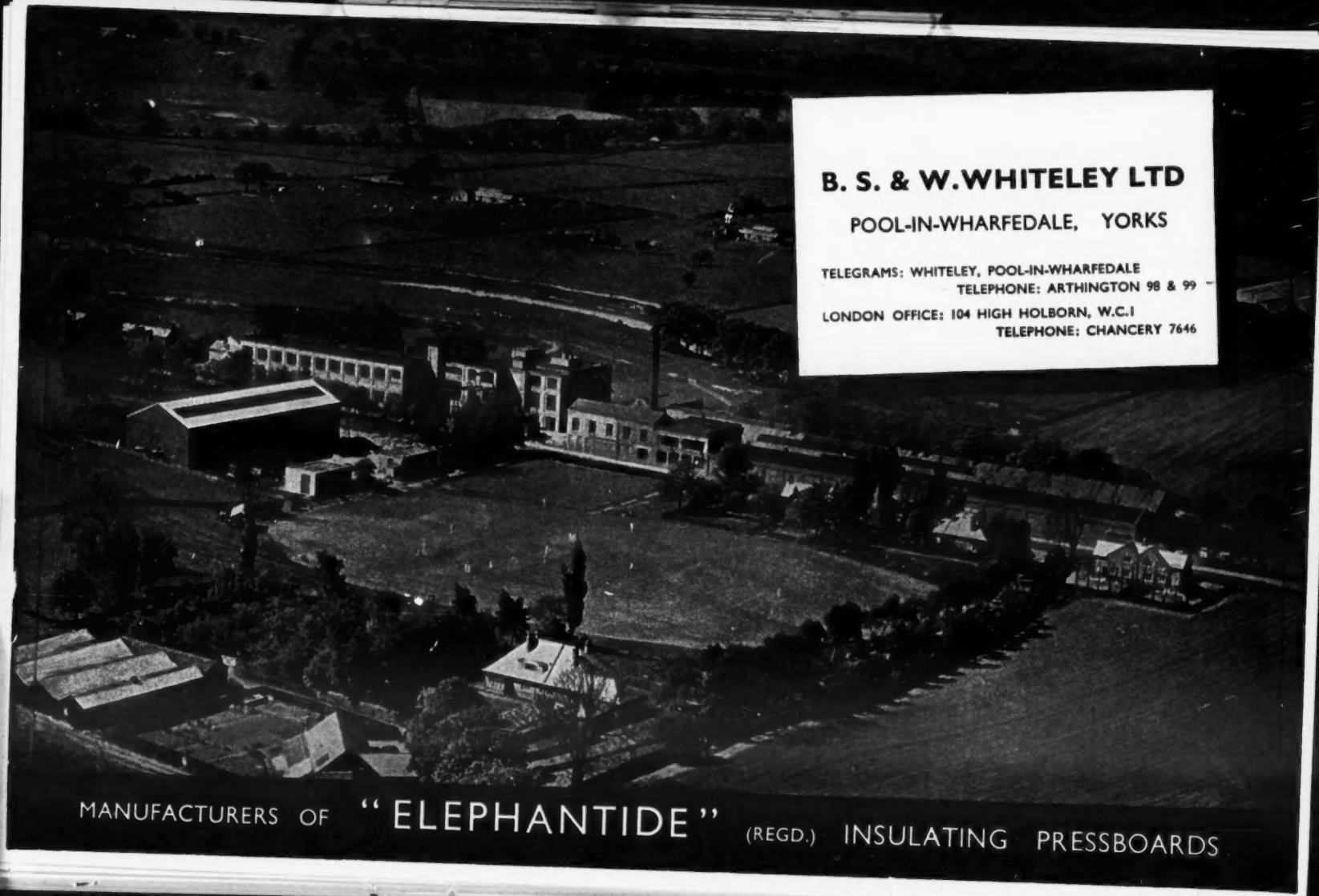
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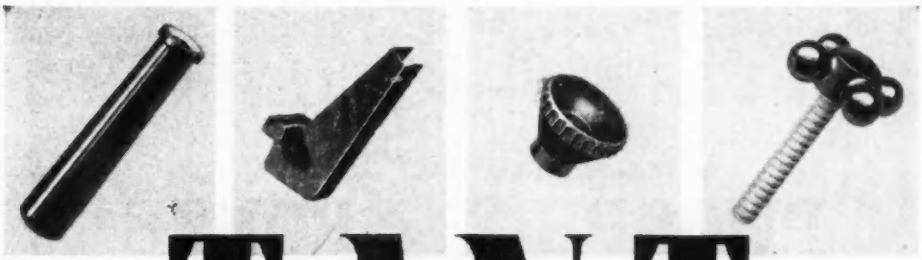

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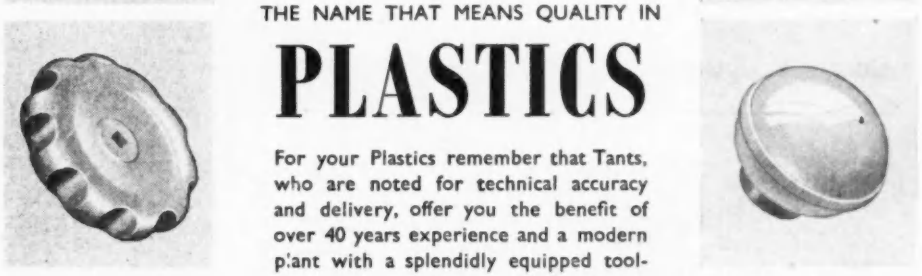

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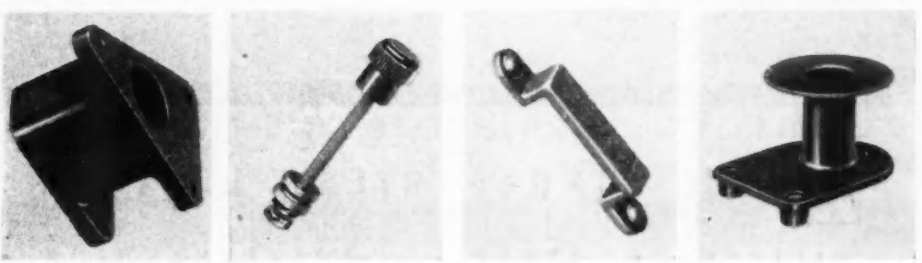

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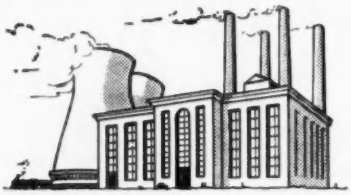

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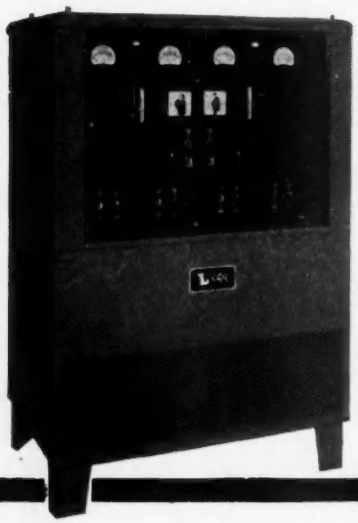

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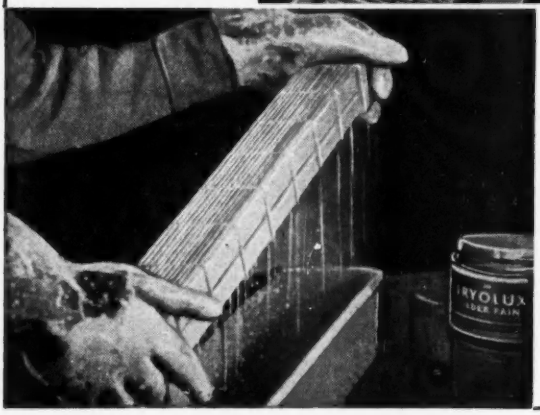


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ELECTRICAL TIMES

Vol. 119 No. 3088 THURSDAY, 11 JANUARY, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

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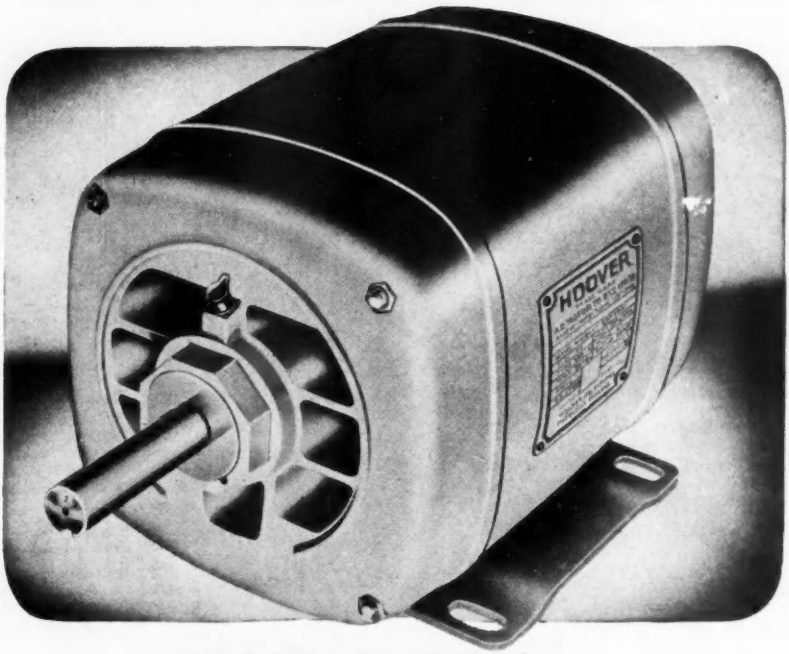


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# Editorial

## *THE SHADOW OF COAL*

THE announcement of the prohibition of signs and shopwindow lighting has swung attention from the plant shortage to the coal shortage, and in the greater threat of a repetition of 1947, such things as load cuts become relegated to second place. Not that this threat is a serious one, for only the advent of exceptionally cold weather during the next two months is likely to bring stocks below the danger line. The present step is therefore no more than a precaution, safeguarding against the worst, and one which it is hoped will achieve economy by its psychological effect rather than by direct saving in meter revolutions. The real danger however lies ahead, next winter rather than this one. As Meteor pointed out three months ago, over the past three years winter stocks have been allowed to fall steadily despite an increase in demand for electricity, and this winter's stocks are only just sufficient. With the inroads made during the recent cold spell, spring stocks are likely to be lower than at any time since 1947, and strenuous efforts will be necessary next summer to build up reserves to a satisfactory value by the autumn. The solution may be found in an acceleration of open-cast working which seems to be the most reliable source of coal.

## *THE HUMBLE ELECTRIC FIRE*

IT IS fashionable to pour scorn on the electric fire and blame it for the peak-load difficulties which beset the supply industry: it is even more fashionable in non-technical circles to speak grandiloquently of electric space heating in the same terms, as though this were no more than a synonym for the humble electric fire. So extravagant have some views become that one speaker went so far as to suggest that electric fires connected each year, absorbed approximately the whole increase in generating plant. Unfortunately the true position is not easy to assess accurately, but one can at least obtain a clue from the Digest of Statistics. This shows that current production of fires is only one-third of the estimated pre-war figure and to that extent the situation has improved. During the past three years there has been no more than a slightly increasing level in production, so that it is justifiable to equate the figures given in the Digest with actual sales. If, then, the average rating is assumed to be 1½ kW it can be concluded that electric fires are being connected at the rate of about 400 MW per annum. This is indeed a frightening figure if there is any truth in the oft repeated allegation that the majority of fires are switched on at the peak, but does actual supply experience bear this out? The figures in the Digest suggest that fires are responsible for probably only one quarter of the incremental non-industrial heating load, and although diversity is undoubtedly greater for kettles, cookers and water heaters, they all add their quota to the higher cold weather peak.

## *GUILTY WITHOUT TRIAL*

ELECTRIC fires may all appear much the same when sold over the counter, but once they enter an individual home they become entitled to a sub-classification. No longer are they just ordinary fires; instead they become transformed into bedroom fires, lounge fires, dining room fires or even anti-freeze-up attic fires. Each of these has its own individual load cycle, each its diversity factor; some are switched on during peak hours, others provide a completely off-peak load. It is these individual variables that set the limits to a proper assessment of the position and as there are no data on which to base a proper judgment, it is left to anybody to guess. But when all excuses are made and all diversities allowed, the electric fire remains a major factor of the cold weather peak. As this is one of the more serious problems facing the B.E.A. it is surprising that they have not carried out a large-scale survey to ascertain

the extent of the guilt of the domestic electric fire, not to speak of those used in commercial buildings which have a much more limited off-peak usage. Without this full knowledge there may be undue suppression of an appliance which can provide a substantial mid-season (and in our unfortunate climate, even a summer) load, that many former electricity undertakings exploited to their advantage.

## *SILICONITIS*

THE receptiveness of the American engineer to new ideas and methods is shown by the experiences of a Michigan repair firm, recounted elsewhere in this issue. An intensive selling policy for high-temperature insulation has resulted in a growing proportion of customers who are willing to pay double price for rewinds with silicone materials, from which they expect to get increased output, and from four to ten times the life obtained with normal class "A" materials. It is doubtful whether the same enthusiastic reception would be accorded such a proposition in this country. Quite apart from the fact that the average user expects a rewind to last for ever anyway, it is going to take a long time to educate him not to be alarmed at the prospect of a motor which runs very hot. Nor must the motor's own problems be forgotten. The normal motor is not suitable for continuous high temperature operation, since bearings and clearances alone will usually provide limiting features. Nevertheless, indestructible insulation may one day be regarded as normal, although at first it will be considered as an insurance policy—something in hand in emergencies—and not as a means to enable motors to run well above boiling point. With the growing scarcity in raw materials, however, there will be an increasing trend to stress materials more highly so high temperature motors may become more general.

## *UNTIDY FEEDERS*

"MEGOHM" in his notes this week touches upon what must be a very sore point with many engineers, since so often the incoming supply arrangements to many premises are not so much a part of a plan as an aggregation of afterthoughts. It is, therefore, particularly infuriating when the job has been planned not only to work efficiently and look well, but to take care of future load growth, to have it spoiled by someone else's cherished theories which provide artificial limitations on future growth, as well as giving the job the appearance of a "lash-up." On the face of it there seems little or no reason in the case quoted why the incoming supply cable could not have been brought directly to a cable box attached to the incoming switch-fuse, which would have saved labour and materials for both the supply authority and the consumer in question. There must be many such cases where a little intelligent co-operation between the two sides at an early stage of the proceedings, and a little more spirit of give-and-take in the interpretation of rules and regulations, would have a very beneficial effect.

## *POWER IN HAND*

SMALL power tools, properly applied to the minor jobs of industry, can have a greater effect on production than is usually realised in this country. In the United States they are intensively applied to such tasks as screw-driving, nut-running and hand drilling, and their success is startling enough for members of the mechanical handling productivity team which visited America, to mention in a digression from their main subject at Friday's joint I.E.E./I.Mech.E. meeting. If the fullest benefit is to be obtained from such accessories, careful attention has to be given to their placing, and the American method, noted by the team, deserves close attention. Socket-outlets are provided every 4 or 5 feet along the assembly lines, so that the tools can always be made available for efficient production, and extensive use is made of high-speed type tools. Such provision may seem lavish, but since their success—60% increase in production—so markedly impressed engineers whose main interests lay in other directions, they probably merit greater attention than most British firms have so far given them.

Meteor

# PILED FOUNDATIONS *for Steel Towers*

## *Overhead Line Construction on Marshy Ground*

by C. KIBBLEWHITE, M.I.E.E.

WHERE overhead line supports are sited in marshy or unstable ground, it is necessary to place the foundations of the supports on piles. An interesting example of piling for this purpose has recently been carried out for the steel towers supporting the crossing of the River Medway on the double circuit 66 kV overhead line from Littlebrook power station to the Medway substation of the South Eastern Electricity Board.

This line is being built by British Insulated Callender's Construction Co. Ltd., and the piling work on these foundations has been sub-contracted to the Piling & Construction Co. Ltd.

### *Site Conditions*

On the east bank of the River Medway at the point where the line crosses the river, there is a considerable expanse of marshy land, often under flood water, and the foundations both of the suspension tower and the anchor tower on this side of the river have had to be formed of piles which have been driven down to a depth of some 40 ft. through layers of silt, peat, sand and ballast, to the chalk below. The foundations for each leg of the suspension tower have to withstand working loads of 26 tons compression, 15 tons uplift and 1¼ tons shear. The corresponding loads for the anchor tower are 19 tons compression and uplift with 1¼ tons shear. The piles are of the pneumatic caisson type and the following method of construction is used.

### *Method of Drilling*

A set of shearlegs is set up and centred over the peg locating the centre point of each pile and a steel tube fitted with a splayed cutting edge is used to core out the first few feet of the drilling for the pile. This is done by lifting and dropping the tube again and again. The cutting edge brings away a piece of soil each time the tube is dropped, the tube is then raised, the soil removed and the tube dropped again. Thus the tube gradually becomes embedded in a hole in the ground, and when it has been sunk to a depth of say 3 ft it is allowed to remain, and the cutting of the soil and its removal is carried on by means of a hollow cylindrical clay cutter of slightly smaller diameter than the tube itself, which is dropped into the tube and raised repeatedly, the soil being brought away by the clay cutter on each occasion. As the cutter hollows out the drilling to a greater depth the tube is forced down into it either by its own weight or by hammering the top of the tube. As the tube descends, the cutting edge of the tube removes the small shelf of soil left by the cutter. (See Fig. 1.)

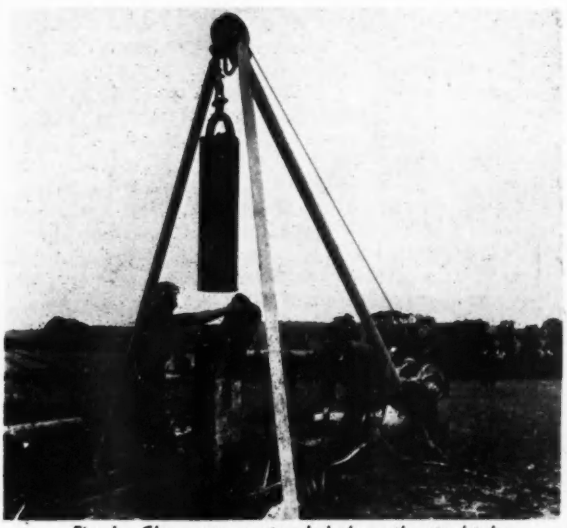

*Fig. 1. Clay cutter suspended above the steel tube*

The tube is 16½ in. in diameter and normally has a length of 5 ft. When the tube has become embedded in the soil to a sufficient depth, another length is screwed on to it, each tube being provided with male and female threading at opposite ends. A protector ring is screwed on to the free end of each tube as it is brought into

*Top left is Fig. 2, showing weighted cylinder being used as a drop hammer, while in Fig. 4 below, it, the airlock fitting is seen in position. Fig. 5 is top right, and shows concrete being poured into the airlock fitting hopper. In Fig. 6, bottom right, the top section of the steel tube is being withdrawn*

use. When the new section of tube has been screwed into position the cutting operation is continued and the built-up tube of 5 ft sections is gradually forced down into the soil.

### *Gravel or Rock Drilling*

When a firm bed of gravel, chalk, rock or other substance is reached there is a choice of two special tools for removing the substance of the bed, according to its nature.

In the case of loose gravel a sludge pump is used, this being a hollow cylinder with a "clack" valve fitted internally near the bottom end. The sludge pump is joggled up and down at the foot of the drilling, the gravel being forced into the cylinder through the "clack" which then closes and retains it inside the cylinder; the sludge pump is then withdrawn bringing away the gravel with it.

For hard solid substances a weighted cylinder with a sharp toothed edge known as a crown cutter and similarly fitted with a clack valve is used to break up and remove the bed, (Fig. 2.)

It is usual to bore from 3 to 5 ft into the solid bed and the total depth to which the tubes have to be driven will be this amount added to the depth of the unstable soil above the bed, which may be anything up to 50 ft.

When the drilling to take the pile has been cored out the reinforcement of the pile, consisting of five $\frac{5}{8}$ in. steel rods bound to a $\frac{1}{4}$ in. steel wire spiral, is lowered into the tube, (Fig. 3.)

Next the concrete is poured into the drilling. If the drilling is dry the concrete can simply be poured into the open end of the tube, but if the drilling is wet then it is necessary to establish an airlock which is done by screwing a special airlock fitting on to the top section of the tube. (Fig. 4.) This fitting consists of two parts joined together by a neck in which there is a heavy valve; the lower part is a cap screwing on to the top section of the tube with a nipple for the attachment of a compressed air feed and a gland for bringing through a hose into the pile drilling, the length of this hose being sufficient for its lower end to reach the bottom end of the drilling. When the pressure is applied through the nipple any water in the drilling is blown out through the hose. The upper part of the airlock fitting comprises a hopper into which concrete can be poured; when the hopper has been filled

it is closed with a bolted cap, the valve between the two parts of the fitting is opened and the concrete mix falls into the drilling. (Fig. 5.)

The bottom of the drilling is filled up with concrete to a height sufficient to hold back water from entering the tube. The first stage of withdrawing the tube is then begun. As each 5-ft section clears the ground it is unscrewed and a cap is screwed on to the next section. This cap is fitted with a compressed air nipple through which a sufficient degree of pressure is applied to force the concrete well into the bottom of the drilling, and to fill up any spaces left by the withdrawal of the tube. One by one sections of tube are withdrawn as the level of concrete rises, pressure being applied at each progressive stage. (Fig. 6.) When the last 10 ft comes to be filled in with concrete, the concrete is consolidated at atmospheric pressure by dollying and by joggling the tube.

The reinforced concrete pile is thus built up to the required level, and a sufficient length of the reinforcing rods is left out of the top of the pile for marrying into the piling cap of mass concrete, into which the stubs of the tower legs are set, according to the type of tower and its situation.

*Fig. 3. Reinforcement for tower foundations*

All photographs published are by courtesy of British Insulated Callender's Construction Co. Ltd., and acknowledgements are due to this Company and to the Piling and Construction Co. Ltd., for permission to publish the information contained in this article.

# *Our readers' views . . .*

## Housing Estates

WITH reference to "CBY's" article on "Electricity for Housing Estates" in your issue of August 21, 1950, I would like to comment as follows.

I agree with his estimate of 1 kW maximum demand per consumer, provided that this applies to the immediate demand for an estate with choice of cooking. An all-electric estate is nearer 2 kW per consumer, and a "choice of cooking" estate should have a network designed for such a demand.

The siting of substations by an architect is to me fundamentally wrong. The supply authorities should be able to say "We want a site there" and be reasonably sure of getting it. In this connection, "CBY" seems particularly fortunate. My experience is that, in general, architects ignore substations and that the supply authorities have to fight for sites, and in many cases are forced into odd corners at the backs of houses, with a consequent increase in capital costs and losses. A badly placed substation can easily mean a wasteful use of large M.P. cables working on 50% of their capacity, but necessary owing to voltage conditions, while a good site will enable smaller cables to be used working near their thermal capacity.

From the transformer and M.P. cable sizes quoted in "CBY's" article, I got the impression that some economy might be effected in capital costs by the use of more smaller substations closer together, combined with smaller M.P. cables, which it must be remembered carry more current per square inch cross section than the larger. The greatest single cost in housing estate work today is in the M.P. network and any steps which can be taken in reducing this cost are, in general, an overall economy. Substation and H.T. costs will increase with more substations, but up to a point this results in a general reduction in capital cost per dwelling. I think the most economical arrangement is to have substations designed for an ultimate capacity of between 750 and 1,000 kVA with two transformers, one to go in immediately and the other when required. The cheapest design will depend on the size and layout of the estate, on the degree of standby considered necessary (in this connection, I think transformers and switchgear should be considered "fault proof"), on whether the authorities will permit the use of outdoor substations, thus

dispensing with substation buildings, on whether each substation is equipped with circuit-breakers or a mixture of breakers and isolators and, most important, on the correct siting of substations, which for maximum economy can be critical.

I do not like the thought of unarmoured services through gardens and into houses; they are much too susceptible to a blow from a spade, even when protected by tiles.

Also, why have 100% transformer standby in each substation? Only one in thousands goes wrong, and they can always be maintained in the summer with alternative M.P. supply from adjacent substations. 100% standby is, to my mind, a fearful waste of money, material and transformer capacity.

"CBY" does not mention protection, but I note that no pilot cores are included in the telephone cable.

*Kenneth H. Quincey*
SOUTHEND-ON-SEA A.M.I.E.E.

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## Consumer Research

IN reply to Mr. Radford's letter in your issue of December 28, it is because consumer research in the years immediately preceding the war did so much to influence present-day design that it is now felt timely to ensure that tomorrow's developments proceed along the right lines. The number of domestic consumers has greatly increased, and electrical education has given an appreciation of modern domestic electricity to thousands whose views are not represented in existing surveys. Moreover, expressions of opinion a few years back may have been modified by later developments.

To be of value a consumers' survey must be comprehensive, and based on *personal* use of electrical apparatus. Neither of these requisites would be met in an amalgamation of statistics obtained from the excellent sources mentioned. The booklet "Towards Perfection" is therefore so designed that the final report may include the opinions of every type of woman, in every type of home, in every part of the country. Moreover, as it is often found that an elementary adjustment of design results in incalculable benefits to the housewife, a wide range of questions is covered, both elementary and advanced.

While agreeing with Mr. Radford that the public is wearied by compulsory form-filling, the E.A.W. has found that women are only too happy voluntarily to commit their views to paper if they feel this will result in improved equipment in the home. Husbands too have proved anxious to record the opinions they have acquired from recent "personal experience"! The fact that 14,000 copies of the questionnaire have already been sent out in response to orders endorses this view.

The questionnaire also serves a subsidiary but important purpose of educating consumers in the efficiency which is to be expected from electrical apparatus, and of the need of selectivity from a wide range for individual needs.

*Caroline Haslett*
ELECTRICAL ASSOCIATION FOR WOMEN DIRECTOR

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## Space Heating

SOME editorial notes in your issue of August 29, 1946, relate to an article appearing on pages 275 and 276 of the same issue, and those notes include:—

> A prime development visualised is serious aggravation of the cold snap peak demand.

The following is taken from the article referred to above:—

> In many undertakings the tendency has been for the load factor to increase, but in all probability the increase would have been more pronounced had intermittent space heating not grown. Last winter was comparatively mild, but the fact is that a cold spell would tend to produce disastrous conditions, both in connection with generation and distribution.

The last sentence of the article reads:—

> The danger is at hand.

This letter is written in no carping spirit, but to point to another danger "at hand."

To increase generating plant capacity and distributing equipment so that cold-weather heating demands can safely be supplied would entail, roughly speaking, the doubling of the capacity needed to supply mild-weather demands, and the capital outlay to do that would be enormous—with the result that half the total capital expenditure or thereabouts would, with a great part of the generating plant and distributing apparatus, remain idle for the greater part of the year.

To so increase capacity and equipment to enable cold-weather demands safely to be supplied would be economic madness, and it is to be hoped that those in power have not become irrevocably committed to such madness. Madness and palliatives are of little value —what is wanted is a sensible cure.

*A. J. Fippard*
PARK LANE, W.1

# Control of the Grid

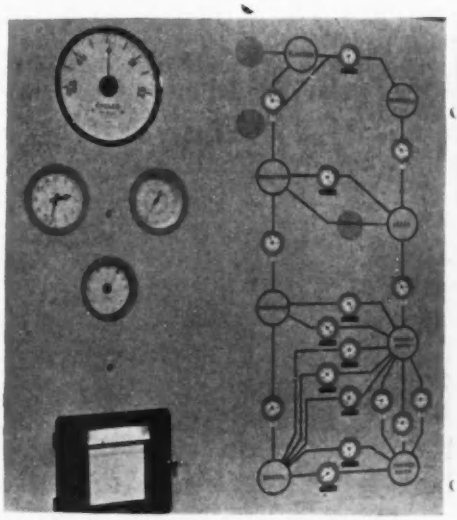
## Paternoster Square in London's Blitzed City houses three new Grid Control Centres

SITUATED in the bombed wilderness to the north east of St. Paul's in London, is an unpretentious two-storied building which now provides the temporary home of the National Grid Control Centre and the two Thames Control Centres. The removal of National Control from the former C.E.B. Centre in Newgate Street was dictated largely due to congestion and the increasing obsolescence of the indication and communication equipment. Advantage was, therefore, taken of this move to house the three centres under one roof.

### *Functions of National Control*

In order to appreciate the working of National Control, it is important to realise the essential functions which are carried out there and to obtain an overall picture of the general administration of the Grid. The primary task of National Control is to maintain general co-ordination of interconnected operation, via the Area Control Centres at Glasgow, Newcastle, Manchester, Leeds, Birmingham, London and Bristol. It has no concern with the operation of individual generating stations, the instructions issued by it being carried out by the Area Control Centres.

Secondly, National Control has the task of ensuring that inter-area energy transfers take place in such a manner that the most economic system working is obtained. This involves the maximum use of high thermal efficiency generating plant, and to this end, transfer programmes are arranged on a weekly basis in the light of plant availability, generating costs and expected demands in each of the Areas. These

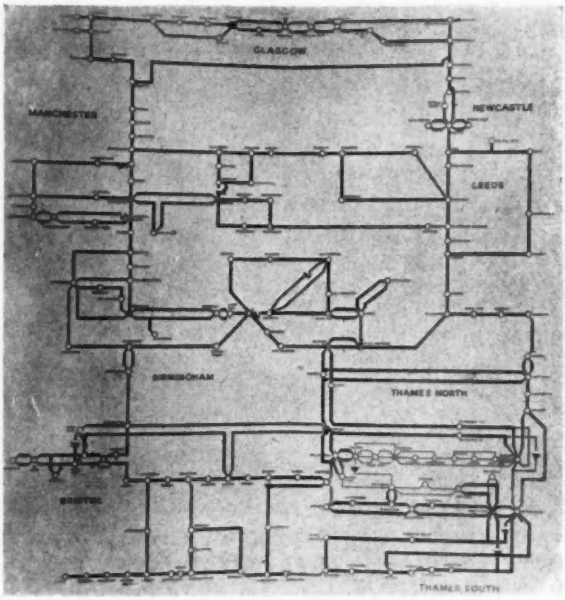


*View of the Grid schematic to show metering*

programmes are, however, reviewed, and, if necessary, revised each day to take into account any changes in anticipated conditions.

Third, National Control is responsible for co-ordination of main transmission line and generating plant maintenance programmes and last, it is also responsible for frequency and time control of the interconnected system.

In addition to the above, present-day circumstances have added a further important function—that of overall control of load shedding. The two main reasons for load shedding, which is, of course, directly due to plant shortage, are when, due to area unbalance, the tie lines begin to carry current up to the limit of thermal capacity, and when the frequency of the system begins to fall toward the 48 c/s mark.

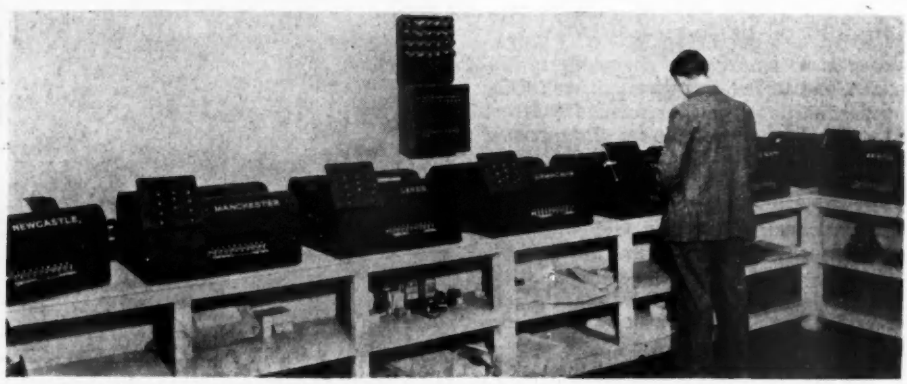



*This comprehensive mimic shows the state of the Grid lines*

## *Layout of National Control*

The information required by the control engineers is displayed on a curved panel forming one side of the room. This panel carries a schematic diagram of the Grid system on which small magnets can be placed to indicate lines out of service for maintenance or due to breakdown; a simplified diagram showing inter-area lines only, but with meters mounted in each line to show the power being transmitted and the direction of flow, and frequency meters, clocks, time error recorders and chart recorders. A space has been left for a schematic of the 275 kV Grid on which the position of all circuit-breakers will be automatically indicated. An unusual instrument is a "rate of change of frequency meter" reading in c/s per minute.

Alongside the control room is a teleprinter room containing teleprinters for all the Area Control Centres. Again an unusual feature enables the outgoing messages to be "paralleled," so that a message typed on one machine is automatically transmitted by any selected combination of the rest. Each machine, however, automatically prints its own particu-




*From the teleprinter room above, National Control issues instructions to all Control centres*

lar call heading (e.g., NC to Bristol) and the replies come through normally.

The two Thames Area Control Centres are housed on the ground floor of the building below National Control. These are called North Thames and South Thames and cover an area from the Wash to Littlehampton on the South Coast. The dividing line between areas is mainly the route of the river Thames. Although housed in the same building, National Control and the Area Centres communicate by teleprinter as by this means a complete record of all instructions, etc., can be recorded and filed. Each Control Centre, however, has private lines direct to all generating stations and grid substations in its area.

### *Area Control Functions*

The two main functions of the Grid Control engineer are the switching of Grid circuits and the loading of generating stations. Again mimic diagrams are used to show the condition of the networks under supervision, and metering is provided to show power flow on the more important lines. No direct switching is, however, carried out from the control room, the actual work being done at power stations or substations by telephoned instructions.

Each loading desk is provided with a "routine instructor" by which instructions can be sent to the more important generating stations. This instrument is used for the picking-up or dropping-off of various amounts of load and for load shedding. In addition, stations not so connected can be contacted by telephone.

A reproduction of the National Grid diagram, similar to the one in National Control, is kept up to date in each Control room so that line outages, etc., are known. This enables the operators to estimate the general effect of the national network condition.

At the time we were present in the Control Centre (about 5 p.m.) the system was running at 48·5 c/s with a 5% load cut; by 6 p.m., the frequency had risen to 50·5 c/s and the load-cut restored. It was of interest to note that after 6 p.m., the inter-area transfers were very small with the exception of the Newcastle-Leeds-London link which was moderately loaded. Some idea, however, of the rapidity with which the morning peak arises can be gained from the fact that between 7.36 and 7.40 a.m. the system frequency can fall from 50·5 to 48·5 c/s.

A further point, not often appreciated, is the difficulty of paralleling machines when the system frequency is low, as in many cases the governor gear will not take over at the low speed and control has to be exercised by manual operation of the steam inlet valves.

# Research on Dielectrics

INVESTIGATIONS into the properties of dielectrics have figured prominently in reports recently released for publication by the Electrical Research Association. In Report L/T191 (13s. 6d.) for instance, Mr. A. Morris Thomas, B.SC., A.M.I.E.E., F.INST.P., discusses the breakdown of dielectrics by electric discharges, with particular attention to solid insulating materials. In the course of describing various experiments, it is shown that the breakdown process starts and is completed in a very short time. Based on the results of the investigation, a method of test for "corona resistance," suitable for industrial use is suggested.

Report L/T 222 (4s. 6d.) is concerned with the search for materials of high dielectric constant. The author, Mr. B. Szigeti, deals with a recent equation which connects the dielectric constant of diatonic polar crystals with other fundamental physical properties of the materials, and draws certain conclusions as to the conditions favourable to a large dielectric constant.

In report L/T229 (12s.), gaseous dielectrics are discussed under the title "Corona and breakdown at frequencies up to 12 Mc/s." Dr. A. W. Bright, B.SC.(ENG.), PH.D., the author, first gives an account of previous work on the electrical breakdown in air at frequencies up to about 100 Mc/s. He goes on to describe a series of experiments on the breakdown at high frequency, of a concentric cylinder arrangement in air, and includes some interesting photographs and oscillograms. There are further results of investigations into the gap distance above which breakdown voltage is no longer independant of frequency. This was determined for air, nitrogen, freon and oxygen at atmospheric pressure. Finally, a simple theory is put forward to explain some of the results.

High temperature rather than high frequency is the subject of report L/T242, in which Mr. W. Leathersich deals with the strain-time relationship for solid dielectrics near the softening temperature. No change in creep properties was found, as compared with room temperatures.

Finally comes the largest of the present reports —a critical resumé of published information on the determination of the temperatures of an electric discharge in a gas, prepared by Dr. H. Edels, PH.D., B.SC.,TECH., A.M.I.E.E., and issued as Report L/T 230 (24s.).

All the reports reviewed above may be obtained from the Electrical Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, at the price stated, plus postage.

# *Progress in Production*

## Further reports show increasing demand for turbo-alternators, transformers and other equipment

*No. 2. Ferranti Ltd. and C. A. Parsons and Co. Ltd.*

### Ferranti Ltd.

A CONTINUED increase in demand for large power transformers has again been experienced in 1950. This has kept the transformer department of Ferranti fully occupied. Included in orders received for high-voltage power transformers are twenty 60 MVA, 132 kV, 3-phase units for the BEA and twenty-six single-phase 220 kV transformers for New Zealand. For India three 20 MVA and two 10 MVA, 132 kV units are required for the Damadar Valley scheme, while fourteen 11 MVA and the same number of 13·5 MVA transformers are on order for Johannesburg and Sydney respectively.

The overseas units sent abroad during the year have required considerable skill and ingenuity on the part of the Ferranti engineers in handling and shipping. These included two 45 MVA, 3-phase, 150/33 kV units for Portugal and one of the five 3-phase, 231 kV, 64 MVA transformers ordered by the Imatra Power Co. of Finland. In this latter case the windings and core were shipped separately from the tank bushings and auxiliaries. Distribution transformers continued to be required in large quantities over 2,000 with a capacity of half a million kVA having been ordered.

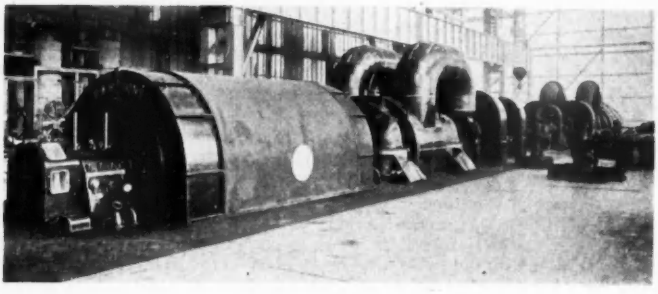
Moving coil regulators remain popular, the number ordered during the year being over 330. Large regulators include a 4,400 kVA, 3-phase, 6·6 kV unit for Australia, ten 2,840 kVA, 3-phase, 4,000 V units for Brazil, a 4,500 kVA 3-phase, 4,000 V unit for Argentina and several 11 kV, 3-phase regulators for the home market.

#### *Testing Plant*

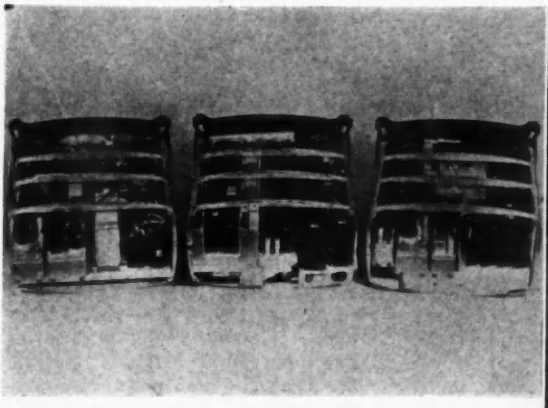
Ferranti's are well known for high-voltage testing plant, and several orders for a.c., d.c. and impulse testing equipments have been received. For cable-testing purposes are several 300 kV a.c. installations and other items include a 1,000 kV d.c. unit and 1,500 kV and 2,100 kV impulse generators. Equipments completed are represented by the 1,400 kV impulse generator at the B.E.A. Research Station, Leatherhead, and 500 and 300 kV testing transformers have been supplied to a large switchgear manufacturer's works. Shortly a further 500 kV transformer will be supplied to the same works to run in cascade with the existing plant to give an overall test voltage of 1,000 kV. An export order fulfilled was the complete installation of a 600 kV a.c. testing equipment in the Oslo works of Messrs. Standard Telephon og Kabelfabrik, for the pressure testing of high-voltage cables.

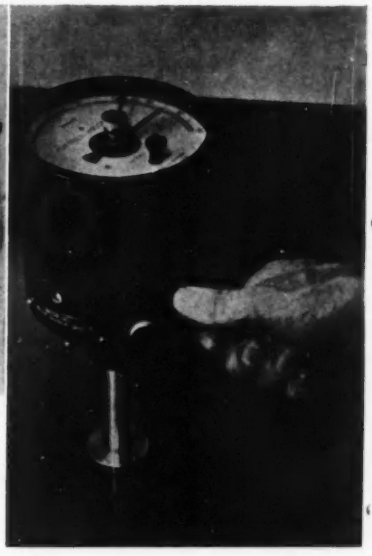
#### *Instruments and Meters*

On the instrument side, several new developments have been marketed this year. Of particular interest is a new range of dynamometer wattmeters. The three-element unit is of unusu-



*This picture shows two 50 MW Parsons turbo-alternators installed at Dunston B power station on Tyneside*





*Shown above are the three units of the Ferranti aircraft homing and distance measuring equipment. In this picture the covers have been removed. On the right is the Ferranti portable viscometer, showing the method of use. This direct reading instrument gives measurements in c.g.s. units*

ally compact design being comparable in depth with the existing type of two-element dynamometer wattmeters. Viscosity measurement has been greatly simplified by the portable viscometer which gives immediate readings direct in c.g.s. units, and it can be used continuously to give readings of viscosity during processes where changes need to be known. The "clip-on" ammeter range has been extended by the Model L seven-range instrument which has been specially designed for use on porcelain-clad fuses, and in consequence can take conductors up to 4 in. diameter. A further meter launched was the single-phase meter type FM fitted in a bakelite case and having a measuring range of 100-1. This is for use in the export field.

### *Radio and Domestic Equipment*

On the radio side, a distance measuring equipment operating in the 1,000 mc/s band has reached prototype stage. Designed for aircraft use, this instrument provides continuous information, using an interrogator-responder system, of distance and bearing.

The Domestic Appliances Department produced a new electric fire, the Safera which has a degree of safety never previously achieved by a radiant type of fire. This contains an automatic switching device which cuts off the supply if the fire is knocked over or lifted, and has special guards which make it impossible to poke anything into the element.

## C. A. Parsons and Co. Ltd.

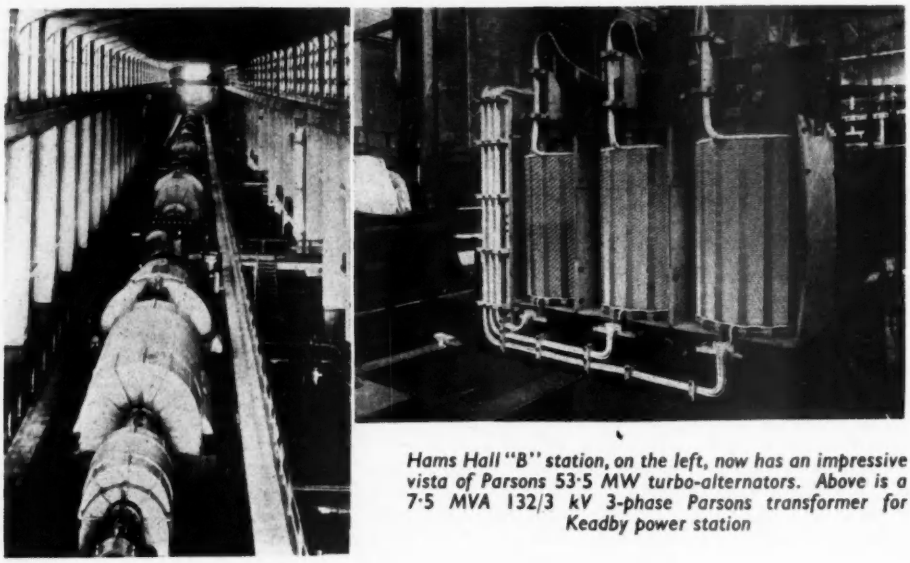
Export orders comprise the greater part of the machines ordered during 1950, and they range from single-cylinder sets of 4,000 kW up to large units of 100,000 kW. Canada, for example, has sets on order for 5, 7·5, 15, 30, and 100 MW capacity while South Africa has ordered machines of 20, 40 and 60 MW. Other machines are required for Australia and Mexico.

Five pass-off sets ranging from 300 kW to 12,500 kW have been ordered in this country for a board mill, a paper mill and a steelworks.

Many large turbo-alternators are in process of erection at home and abroad. Two 50 MW and one 30 MW set are being installed in Australia; two 30 MW and one 50 MW sets in India, and at home, six 60 MW and six 50 MW are in hand. The alternators for the 60 MW sets will be hydrogen cooled.

Turbines were put into commercial operation during the year as follows: two 30 MW, one 50 MW and one 2,500 kW units at Cossipore, and one 4,000 kW set at Benares (India); one 12,500 kW set at Port Elizabeth and one 1,200 kW set at Windhoek (Africa); one 30 MW set at Newport C and one 15 MW set at Brisbane (Australia), and 15 MW sets have been completed in Canada, Mexico and Iraq.

The second 31·5 MW set has been put into service at Ballylumford Power Station, North-



*Hams Hall "B" station, on the left, now has an impressive vista of Parsons 53·5 MW turbo-alternators. Above is a 7·5 MVA 132/3 kV 3-phase Parsons transformer for Keadby power station*

ern Ireland, and in this country a second 50 MW set was completed at Dunston "B."

### *Gas Turbines*

Erection work is proceeding on the 15 MW gas turbo-alternator for Dunston "A" and also on the 10 MW gas turbo-alternator for the National Gas Turbine Establishment. A new gas turbine of 2,500 kW output is being manufactured and embodies all the design information made available over the past five years. It is thought that this machine may well serve as a basic model for future developments, and it is considered that this type will be particularly suitable for erection abroad where the cost of handling large components and the construction of extensive foundations is prohibitive. Work is also being carried out on systems of utilising coal as a fuel in the gas-turbine cycle.

### *Transformers*

The number of orders for transformers and reactors continues to increase. Large units are represented by eight 45 MVA, 132/33 kV installations ordered by the B.E.A. and a 75 MVA 11/35·4 kV unit for Brimsdown. For export to Spain are two 25 MVA, 128·4/70/11 kV units. Many large contracts for distribution transformers are in course of production. These include a total of seventy-eight between 10 kVA and 750 kVA for the South East Scotland Electricity Board; thirty-seven for the North of Scotland Hydro-Electric Board, forty-three for the North Western Electricity Board; two hundred and sixty for export to Australia; twenty-seven to Malaya and fourteen to Gibraltar.

An interesting order received and completed during the year was one for fifteen 100 kVA, 3-phase, 50 c/s, 6,300 to 3,150/220 V transformers, required for operation at an oil refinery in Sumatra. These are of the hermetically sealed type, tap changing being carried out by means of externally operated switches.

### *Miscellaneous*

The Optical Works has some interesting orders going through, including two 74 in. reflecting telescopes for Australia and Egypt and an order for a similar item for France has been received. The Australian mirror will be on view at the Festival of Britain Exhibition. The mirror for the 98 in. dia. telescope for Herstmonceux Observatory is now being worked and so far some 2,000 lb of glass has been machined from the casting. Orders for infra red spectrometers continue to be received and the extra production facilities are being made available for these instruments.

The new pipe shops erected at the request of the B.E.A. for the fabrication of h.p. steam pipes have been completed and cover 100,000 sq ft. Work was begun on these shops in November, 1949, and the first pipe bent in October, 1950—a remarkable achievement.

*Notes on Wiring*
by MEGOHM

# The Consumer's Fuses

## *Main intake connections*

ALTHOUGH a certain measure of uniformity has been arrived at in connection with supply intake arrangements for the smaller installations, since the introduction of the consumer's control unit (B.S. 1454), we still find that practice varies considerably for the larger installations. Although each individual sub-area of a region may adopt one standard, there is no guarantee that this may apply to another sub-area, even in the same region, which makes it difficult for anyone planning an installation.

I can appreciate the fundamental principle governing the contention that the supply authority should reduce the length of unprotected service-cable run on private property to the least amount possible, but that does not necessarily mean that the most satisfactory layout is achieved in every instance.

Each case contains its own problems, and must therefore be treated on its merits, and where supply is given at high tension with a transformer substation on the premises, easy means of access at any hour of the day or night is a necessary requirement.

### *Three-Phase, Four-Wire Supply*

In one case I was interested in, supplied at medium voltage at standard pressure, we had an installation consisting of roughly 100 kW of lighting and 200 kW heating and power, approximately balanced over the three phases, and thus giving an "all on" current of nearly 420 amps per phase. Allowing for a suitable diversity, it was estimated that 300 amps would be the maximum normal loading.

To control this load, and with a view to possible future extensions, a 500 amp main switchfuse was fitted direct to, and below, a large bus-bar chamber, with the three subsidiary switchfuses mounted directly above the chamber. This layout gave ample space for the necessary meters and the undertakers' cut-outs, which it was hoped could be mounted directly below the main switchfuse, if persuasion failed to obtain their omission altogether.

In a layout of this character it is difficult to see that these extra fuses serve any practical purpose, other than to indicate the precise point of the service termination, as due to the metering being connected to the outgoing circuits both the main switchfuse and the chamber would be sealed. I.E.E. Regulation 105 states specifically that "if the main switchgear, although supplied and installed by the supply authority, may be operated by the consumer, it need not be duplicated by him." Clearly this regulation was devised with a view to reducing the number of fuses in close proximity to each other, carrying the same load and protecting the same conductors.

### *Out-of-Date Methods*

In this particular instance we failed to convince the mains engineer that his standard method was out of date, and in the result the service cable was brought in at ceiling level, which happened to be just below pavement level, and terminated in the usual sealed cut-outs, mounted almost at ceiling level on the return wall. This arrangement thus necessitated four right-angled bends for the interconnection of some 10 feet in length, and as it was not considered worth while to use p.i. cable with two endboxes, nor a special solid copper conductor system encased in trunking, plain v.r.i. tails were decided upon.

Now if we wish to enclose these in some form of conduit or trunking we find that according to regulations the smallest size permitted for our load is a 0·5 sq in. (61/·103 in.) which will carry 330 amps. Alternatively if we decide to run them open and spaced on cleats we may reduce the size of conductor to 0·4 sq in. or 61/·093 in., which is rated at 420 amps.

This latter course was in fact forced upon us as the incoming service was in fact of smaller section, though capable of carrying the current due to being laid direct in the ground. For this reason, probably, 300 amp main cut-outs had been deemed sufficient, and these were not suitable for cable sockets above 0·4 sq in.

The net result then was that we had little, if any, reserve capacity in the undertakers' equipment, a not too satisfactory layout, our main fuses had to be cut down to the smallest possible size and there was no appreciable difference in the sizes of the two sets of fuses.

# Mechanical Handling

## *American Methods described at Joint Institution Meeting*

AS a result of their visit to the United States, a 12-man Anglo-American Council on Productivity team returned to this country with the firm conviction that British industry could benefit enormously from a greater concentration on mechanical handling techniques. Their ideas were expressed at length in their official report, but further emphasis was given to some details at a Joint Meeting of the Institutions of Mechanical and Electrical Engineers held on Friday last, when a paper was read by three members of the original team—Messrs. A. Roebuck, M.I.Mech.E. (Hadfields, Ltd.), H. S. Carnegie, M.I.Mech.E., M.I.E.E. (English Electric Co., Ltd.), and E. G. Taylor, B.Sc.(Eng.), M.I.E.E. (General Electric Co. Ltd.).

### *Principles*

It is shown in the paper that American factory managements review continuously and study intensively all matters affecting the transfer of materials and products, and this policy, it is suggested, is directly responsible for increased productivity, and for some major reductions in cost. No mechanical devices new or unknown to British users are applied, but what is available is used enthusiastically.

One point of importance and interest is that the desire to employ the best-known techniques of materials handling is actively fostered in America by the universities and other educational authorities, and by the engineering institutions. Again, special note is made of the large effect of the selling techniques adopted by the manufacturers of mechanical handling equipment.

### *Effect of Piece Work*

High rates of pay and the non-availability of "cheap" labour are stated as playing a major part in accelerating the introduction of mechanisation and the simplification of materials handling, the consequent need to conserve labour focusing attention on mechanical handling so that it has been successfully integrated with the whole productive system. In many factories the absence of piece-work systems has contributed to the ease with which new methods can be introduced. Where incentive schemes exist, the bonus payment is based on the full hourly rate.

Since the solution of mechanical handling problems is not an exact science, there has grown up a practice for a large number of persons in industry in the United States to visit other factories to observe mechanised handling methods. The consequent interchange of knowledge results in a wider application of the best methods. Many companies employ full-time engineers to study mechanical handling problems. An incidental condition of United States economy which favours the application of new techniques is the lower level of industrial taxation, together with a much greater freedom to carry out building operations. These may be necessary if the full benefit is to be obtained from some materials handling methods.

Many details of the application of the above principles are given in the paper, emphasising especially the thoroughness of planning that is necessary. One outstanding case is that of a factory manufacturing washing machines. These were built with three legs and were awkward to arrange for conveyorisation during assembly. The problem was overcome by incorporating the base of the packing case in the assembly so as to form a platform for the unit which could run on a roller conveyor.

### *Palletisation*

Amongst American engineers, palletisation of goods for dispatch is considered the best means yet evolved. Goods so conveyed can be mechanically shifted by pallet trucks at the customers' premises, and man-power costs and the risk of damage and pilferage reduced all round. Where freight-car loading is required, a pusher device can be incorporated in a fork truck, and this can if required be arranged to allow the pallet to be retained when loading outgoing goods.

A recent development, the "automatic pallet loader" is a power-operated machine which receives cartoned or crated goods from a conveyor system and stacks them on a pallet in successive layers to a predetermined pattern. The completed load is ejected on to a conveyor to be picked up by a fork lift truck, the next pallet coming automatically into position. Twisting and positioning the packages is controlled by photo-electric cells. One machine of this type palletises 1,200-1,500 cases per hour.

# THE RING CIRCUIT

## *Some Comments on the Regulations*

by T. C. GILBERT, M.I.E.E.

THERE is no doubt that the introduction of the ring circuit, with its necessary concomitant accessory, the all-purpose 13-amp socket with fused plug, has led to more adequate installations in local authority post-war housing, and at reasonable cost. There is, however, a long way yet to go before this method receives universal approval or acceptance, and in view of the fact that some opposition appears to derive from experienced electrical contractors, it might be opportune at this time to examine some of the points put forward by those not wholly in favour of this relaxation of rules and regulations.

One objection, that there always exists a possibility of incomplete continuity of the ring, not indicated by normal continuity tests and discoverable only after considerable overheating of the conductors, with possible damage, has occurred, is dealt with in the 12th Edition of the I.E.E. Regulations under an entirely new regulation, No. 1106 (B). This says: "A test shall be made to verify the continuity of every ring circuit installed in accordance with Regulation 201 (C), Exemptions (iii) and (iv)," but many consider that this is inadequate as it makes no mention of test for the same degree of continuity of the earth circuit. That is to say, although with some wiring systems under the best practice the earth circuit is formed as a ring in the same way as the circuit conductors, yet the Regulations do not require this in so many words.

This appears a valid point, as a brief examination will show. It is probably difficult, and many will say unnecessary, to ensure that with steel conduit the earth continuity conductor, provided by the conduit, is actually in the form of a ring, and connected to its earth electrode at each end, but with alternative systems such as tough-rubber-sheathed cables, lead-sheathed cables and insulated conduits, in which the earth continuity conductor is provided by means of a special conductor, this can, and should, be ensured. With the 7/·029 conductor ring protected by means of a fuse rated at 30 amps it is possible for leakage currents up to 45 amps to flow more or less indefinitely, with impedance in the earth circuit or at the fault, and this condition must be anticipated at some time or other.

### *Size of Earth Conductor*

According to Table 18, 12th Edition, with twin 7/·029 metal-sheathed cables, as would be used for the ring circuit, the earth continuity conductor need be no larger than 1/·044; with tough-rubber sheathed cables of the same capacity the earth continuity conductor may be 3/·036. It is true that with metal-sheathed cables this small earth continuity conductor is reinforced by the metal sheath, yet it is very unlikely that, especially with lead-sheathed cables, the total conductivity would exceed that of the earth continuity conductor of tough-rubber-sheathed cables (3/·036), and this size of conductor is rated at 10 amps, and for some conditions only 8 amps, under Table 5 of the 12th Edition.

As pointed out above, however, this conductor may be called upon to deal with 45 amps of leakage current under certain conditions and for indefinite periods. As it is incorporated in the general assembly of conductors and insulation with metal- or tough-rubber-sheathed cables, any overheating of the earth continuity conductor would have the same deleterious effect upon insulation, especially if of rubber, as any continuous overloading of the circuit conductors. It would therefore appear imperative that these small earth continuity conductors should invariably be installed in the form of a ring, although even then none too adequate, but upon this important point the Regulations are silent.

### *Insufficient Testing*

By implication, the only test required in connection with the earth circuit of a ring circuit is that called for under Regulation 1106 (A): "A test shall be made to verify that the impedance of the earth-continuity path does not exceed the maximum value specified in Regulation 1003 (A)," which is, of course, the one ohm measured between the earth electrode or earthing terminal and any other point in the earth-continuity conductor. The small conductors cited above in con-

nection with metal- or rubber-sheathed cables can easily pass this test, even if single and not in the form of a ring, but such success cannot indicate any degree of safety or efficiency of protection—either in this or any other case.

### *Suggested Additions*

The writer would therefore agree that Regulation No. 1106 (B), requiring a test for continuity of the ring circuit, should be redrafted to include the earth continuity conductor also, especially where wiring systems other than metal conduits are used. It is necessary to include steel conduits also, however, as all installation engineers know only too well how easy it is for earth continuity measurements to indicate high impedance at one or more junctions, or even in some cases complete discontinuity, with the heaviest and best laid conduits, and with ring circuit conductors protected only by fuses rated at 30 amps, adequate conductivity of the earth fault path is essential.

There is less likelihood of the occurrence of high impedance or discontinuity with metal- or rubber-sheathed assemblies incorporating a special earth continuity conductor, but, as pointed out above, under ring circuit conditions the permitted sizes are quite inadequate from the current-carrying-capacity aspect in single form, and scarcely more satisfactory in ring form. With insulated conduits the earth continuity conductor can be made any size desired, of course, but even with these systems the writer would advocate installation in the form of a ring. With metal conduits, and especially with the light-gauge varieties depending upon grip-continuity fittings, and where there is every possibility of disconnection or impedance, it is suggested that a bare copper conductor should be drawn in with the circuit wiring to form a more satisfactory earth continuity conductor, or, alternatively, the conduit should be earthed at more than one point, approximating as far as possible a ring circuit for this important function.

Regulation No. 1106 (B) recognises the weakness of the ring circuit in requiring a continuity test; it is felt that it should take into account the even more vulnerable earth circuit, failure of which is hidden from sight until fire or shock discovers it, and legislate accordingly.

# Silicone Insulation in Repair Work

SILICONE insulation is rapidly finding favour in the U.S. to judge from a recent article in *Electrical Construction and Maintenance*, in which details are given on rewind costs by a Michigan repair organisation, the Henry Electric Company of Saginaw.

Some four years ago the company became interested in silicone insulation and have found it a profitable line, some 10-15% of the total rewind business being now carried out with these materials, providing insulation to class "H" requirements of the A.I.E.E. regulations, for continuous operation at 180° C.

### *Materials and Costs*

Materials normally used include silicone-bonded glass-mica-glass slot liners 15-20 thou. thick, silicone-glass laminated board slot wedges and double-glass-served silicone-bonded winding wire, with braided leads. Connections are made either with high melting point solder or, preferably by brazing. Stators are given two dips in D.C. 996 varnishes, special tanks having been made to reduce the amount of varnish required for complete immersion of a stator. Baking temperatures are 150-250° F. for the first bake (12 hours) while the final baking takes 8 hours commencing at 300° F. and gradually increasing to 400° F. at the completion of the period.

Material costs for a class "H" rewind are found to range from 2-4 times those of Class A materials, while labour ranges from 1·3-2·8 times as much. This latter seems to be explained by the extra care hitherto needed in winding and it is stated that the introduction of wire coverings having greater abrasion resistance than those hitherto used will, it is confidently anticipated, reduce the labour charges to a figure comparable with that for conventional materials. Complete schedules of labour and material charges, selling price and profit are given, and it is of interest to note that the total costs of the class "H" rewind vary from 3·15 times for a 2-h.p. motor to 2·5 times for a 50-h.p. motor. Nevertheless on a simple policy of charging twice as much for a class "H" job, the actual gross profit is considerably higher.

It is pointed out that many customers are glad to pay twice the price for a rewind, since they obtain from 4-10 times the working life from heavily loaded motors. Examples are quoted in which motors which are fully loaded and braked by d.c. injection 105 times/hour gave six months life with class "H" insulation as against six weeks with class A. Another example is given of ten 50-h.p. motors whose loads had outgrown them being rewound to give 75 h.p. Since they were already 12 years old and their original cost had been written off, the net saving over their replacement by new motors was of the order of $15,000.

# Problems and Practice

## IN ENGINEERING

### *Secure Earthing*

THE importance of earthing is usually well recognised, but there are still accidents which occur due to insufficient earthing. A usual cause of this is the extension of the installation: while the main earthing conductor may have been of ample size originally, it becomes outrated. The resistance becomes such that on the occurrence of an earth fault, part of the current passes to earth by leaking from the earth conductor via the building structure, the actual extent to which this occurs being determined by the humidity. Electrolytic corrosion and wasting may result, being specially serious when the conduit forms the earth conductor.

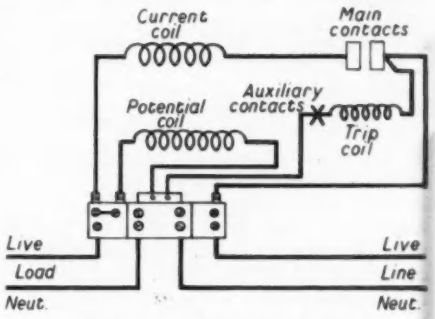
For all except very small possible leakage currents, a separate earth conductor should be used, run on the outside of the conduit and insulated from it with suitable paint.

In the case of motors driving pumps, earthing is specially important, as the liquid filled piping forms an excellent earth, and if the motor is defectively earthed, part of the leakage current will pass through this piping causing wasting at the joints. Long earthing conductors to a central earth should be avoided owing to the increased exposure to mechanical damage. Local earths can be made by sinking a 2 in. hole about 2 ft in the ground, and inserting in this a length of 1½ in. conduit from which the paint has been scraped. If this is filled with water and a copper earthing rod then placed inside it, the dampness is retained for long periods and an effective earth obtained.—*W. E. W.*

### *Noisy Meter*

WHILE carrying out a routine inspection at a large departmental store's hostel, I observed a small box full of shillings resting on top of a privately owned prepayment meter, supplying a 2 kW panel fire. The occupant of the room, hastening to remove them from my way, explained that ever since the meter had been installed they had been obliged to put a coin in before the one already in the meter "ran out," otherwise the meter made the most terrible noise.

Obviously something wrong here, so I decided to investigate: as I started to remove the meter cover, I noticed that the line and load connections were reversed. On manually closing the auxiliary contacts, thereby energising the "trip" coil, and opening the main contacts, sure enough a very considerable noise




*Prepayment Meter Connections*

was set up, due to the "trip" coil remaining energised, so causing its armature to vibrate against the pole faces.

Reversing the line and load connections to normal cured the above trouble, but now the meter ran backwards.

Further investigation proved that the leads from the potential coil were reversed inside the meter, and the installing electrician reversed the line and load, in an endeavour to set matters right, but in doing so had made it possible for the "trip" coil to remain energised, when the auxiliary contacts closed, thereby causing the noise complained of. The diagram shows how this came about.—*J. E. L.*

### *One Phase Missing*

I HAD installed a 2 h.p. 3-phase 400 V motor with star-delta starter in premises which were situated in what one would describe as a residential area. The installation inspector had connected to a new 3-phase meter and cut-outs, and had tested each phase to earth with a test lamp, but the motor only appeared to be getting two phases. Being late in the afternoon he left me to my troubles, as he described it. After checking through everything, including the motor terminals with the starter held in, I began to suspect a faulty motor as my test lamp still indicated three phases to earth.

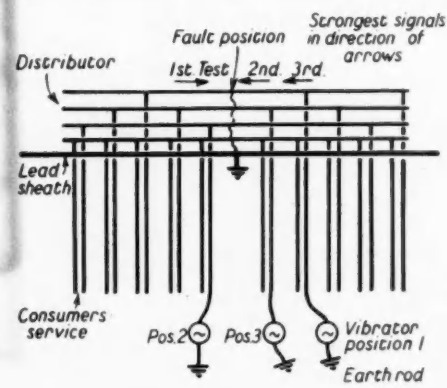
The condition prevailed, however, and after making up two lamps in series I found to my consternation that two phases were the same. Fortunately I was friendly with the installation inspector and sent for him, but it was a difficult job to convince him that all was not well with the mains supply.

Eventually he telephoned his mains department and found somebody who remembered that somewhere between the substation and the cable feeding the new service there was only a 3-core cable, making two phases and a neutral. Although it necessitated digging up the main road, the 3-core was replaced by a 4-core cable, and all was well with the motor. —*H. B. J.*

### *Locating Cable Faults*

YOUR correspondent, B. L. Stanford's method of using a search coil to pick up an injected signal when tracing a fault on a d.c. feeder is interesting. It is generally accepted that the search coil method of tracing a fault on armoured cable is unsatisfactory and usually inconclusive. There is, however, one method of applying this test which I have found most successful when tracing a fault on a distributor with all cores down to earth.

A consumer's service about half-way along the faulty distributor is first selected as a point to connect the vibrator. When this has been done the search coil is carried over the faulty cable and almost invariably indicates in which direction the trouble lies; the signal being




*Application of vibrator to fault detection*

picked up strongest when walking towards the fault position.

The vibrator can then be moved and reconnected at another suitable service point on the reduced section. This can be carried on until the fault is located within fairly fine limits depending on the number of service positions available. This method can save a lot of time and expense by unnecessary cutting of the faulty distributor.—*R. H. Samman, Assistant Engineer, The States of Guernsey Electricity Dept.*

### *Tracking Brings Trouble*

WHILST upon maintenance work in a large rolling mill, I was called to attend trouble in No. 2 substation feeding a strip mill. This sub. contained two 750 kVA and one 250 kVA transformers in parallel, together with the l.t. secondary switch and bus-bar chamber, all against one side of the substation; from this bus chamber ran the cables feeding the outgoing oil circuit breakers through another bus chamber, these switches filling up the opposite wall.

On the roof of the sub. were situated the e.h.t. main breaker and the three transformer primary switches.

Upon attempting to close the main breaker, it repeatedly tripped out. Starting off by isolating each outgoing feeder and inspecting for damage to the cables in the mill, everything appeared to be in order. But the breaker still would not close. Eventually the fault was found. Upon the top of the l.t. secondary bus chamber was situated a voltmeter, and behind this the 5-amp fuses had been screwed to the sheet metal fed by 7-029 v.i.r. from the bus-bars through a bushed hole. Tracking had occurred between these fuses, so forming a dead short. Needless to say, the sub. was dimly illuminated. —*J. Williams.*

### *Radio Interference from Switch*

RECENTLY I had occasion to change a tungsten light for a fluorescent in a new council house. All went well except that on certain wavelengths on the wireless there was very bad interference when the light was switched on. Suspecting the interference-suppression condenser, I changed it and, on switching on, all interference had ceased. However, a few days later it had started again, so I decided to check the switching. The light was controlled by two-way switching, one switch not being used very much and this one I found to be all right in the up position but rather uncertain when down. This was not noticeable on the tungsten lamp, but when it controlled the fluorescent, the choke created this bad effect. After fitting a good make of switch there was no more trouble in this direction.—*J. H. W.*

# Smooth Speed Control

## *Arc Rectifier Installation for Tyre Rolling*

GRID control of mercury arc rectifiers is used to full advantage in a special steel rolling equipment designed and manufactured by the G.E.C. for John Baker and Bessemer Ltd. The problem posed was the provision of a d.c. supply for an 800 h.p., 500 V motor driving the rolls on a machine producing tyres for railway rolling stock. In the process used, a hot blank of the form shown in the illustration is squeezed between two rolls of relative diameters 1:2·5 until both internal and external diameters are comparatively large, and the ring cross section has been reduced and shaped to the form of a flanged tyre.

With the external roll kept at a constant speed, it is obvious that the inner roll must be speeded up as the tyre thins out. Another requirement, in view of the continuous process used, is rapid slowing down of the roll when one tyre is completed. Speed control is secured by adjustment of the mean voltage output of the rectifier, and braking by shorting the motor with resistors.

### *Rectifier Supply*

The main rectifier is a 400 kW, 6 anode steel-tank unit supplied from a 3·3 kV system. In addition to its main anodes, which are controlled by grids, there are subsidiary field anodes arranged to give a constant 220 V output for motor field excitation and control purposes. The main anode control grids are connected through 1,000Ω resistors to a 6-phase peaking transformer, and in series with this connection is a negative voltage from a bridge connected metal rectifier. Thus, the positive voltage from the peaking transformer must exceed this negative bias voltage before the grid can become positive, the arc strike and a d.c. output be obtained.

Voltage control is obtained by varying the phase relationship between the peaking transformer voltage and that of the main anodes. To this end, a phase shifting transformer is provided, with its primary fed from a tertiary winding on the main transformer.

In operation, a master switch is brought to the first of six notches on a controller. This causes the main contacts to be closed and the phase shifting transformer to be energised. The phase shift motor starts up, and the rectifier output is increased until the motor speed reaches 200 r.p.m. At this point—about 5 seconds after starting—the phase-shift motor is cut out. As 200 r.p.m. is approached, pressure is applied to the rolls, and the master switch moved to one of three further "forward" notches, the particular notch chosen determining the acceleration rate of the motor. Acceleration can be stopped at any desired speed by returning the controller to the first notch.

For stopping the motor when the rolling operation has been completed, the controller is brought to the "reverse" notch. this causes the motor armature to be disconnected from the d.c. supply and a resistor to be connected across the armature. As the motor slows down two further resistors are sequentially connected in parallel with the first, full field-excitation being maintained. More gradual deceleration is obtained with the controller moved to the "off" position. In this case only the first resistor is connected across the motor armature, and the field current is reduced at the same time. When either form of braking is used, full negative bias is applied to the control grids before the d.c. contactor opens, reducing the contactor duty.

*Blank in position at the start of the rolling operation*

# overseas news

### Acquisition

The Syrian Cabinet has decided that all electric companies and electric transport concerns in Syria are to become State property in accordance with clauses in the new Constitution. All the companies concerned are foreign.

### Progress at Howard

Reporting to the Wide Bay Regional Board, Queensland, on progress of the construction of the Howard power station, Mr. Saint-Smith, acting manager of the Board, said that the general labour shortage, and low standard of output were delaying matters. The untiring efforts of the Board's staff and the Board's foresight in providing materials had produced a much better than normal result, but until more skilled labour was available and until certain manufacturers increased their rates of delivery any increase in progress would be most difficult. Work on the inlet works was proceeding efficiently but very slowly. This was the key to the opening of the station, he added. Many more men could be used on the job and the contractor sadly lacked skilled supervision in the coffer dam section of the works. The matter of speeding up the job generally was receiving special attention. But the overtime being worked and the special measures being taken could not make up for a 50 per cent. shortage of skilled men. The outlet works were proceeding, and although slow, would be finished before the inlet work. Mr. Saint-Smith reported that boilers promised for steaming in November and then in January were unlikely to be available before February, 1951. The Board's latest estimate of the commissioning date of the station is April, 1951.

### Power from Snowy

The first block of power would be available from the Snowy Mountains scheme in about four years, the Minister for National Development, Mr. Casey, announced a few days ago. Initial output would be about 80,000 h.p. Tenders have been invited by the Snowy Mountains Authority for the erection of the first section of the headquarters executive building, a staff hostel to accommodate 224 officers, and a total of 222 houses of various sizes to be built at different points in the Snowy Mountains area.

### Proposal Rejected

Because they are shallow, Lake Sorell and Lake Crescent do not retain enough water to be used for irrigation or hydro-electric power generation, the Hydro Electric Commission of Tasmania has told the Oatlands Council, who made the suggestion. The catchment area of the lakes was relatively small, the Commission said. Rainfall at Interlaken averaged under 30 in. a year, and evaporation from the surfaces of the lakes caused a loss of at least 30 in. a year. It would be possible to improve the yield by draining one of the lakes and thereby reducing the evaporation loss. Even then, the output from a hydro-electric station would be too small to justify the high cost of installation and operation.

### B.C. Expansion

An expansion programme, costing in all approximately $26 million, has been announced by A. E. Grauer, president of the British Columbia Electric Co. The largest part of the 1951 programme, $18½ millions, is to be devoted to expanding and improving services, including several new large substations. In 1952 the 80,000 h.p. Jones Lake development should be supplying Vancouver with power, and in the following year, the 70,000 h.p. generating unit at Lake Buntzen No. 1 plant should be in service.

### Rural Electrification

Under its rural electrification programme, the Manitoba Power Commission connected a further 754 farms during October, the general manager, Mr. W. D. Fallis, reports.

### Development Agreement

The British Columbia Government and the Aluminum Company of Canada Ltd. have signed an agreement governing the conditions of the company's plan to construct a hydro-electric plant and to establish an aluminium industry on the coast. The company has spent $1m. on surveys and tests during the last two years, and proposes to control the vast water resources of Tweedsmuir Park by a dam on the Nechako River. The original expenditure will be $300m. and eventually $500m. when a town has been built and services installed at Kitimat, an Indian village south of Prince Rupert.

### Water Power

During 1950 the total installed capacity of water-power plants in Canada was increased by over one million horse-power—it is now listed at 12,654,835 horse-power—which represents the development of about 23% of total resources. A large part of the increased capacity was developed in Ontario and Quebec. Making these announcements, Mr. Winters, Minister of Resources and Development, said that the demand for hydro-electric energy continued to expand as a result of a high level of industrial acitivity (partly arising from defence programmes) in conjunction with increased commercial, domestic and

rural consumption. Primary power used during the first 10 months of last year was 8% greater than the consumption for the whole of the previous year.

### Joint Concern

A joint Austro-Bavarian hydro-electric power company, the "Osterreichisch-Bayrische Kraftwerke A/G" has been founded recently for the exploitation of the hydro-electric power of the rivers forming the frontier between Bavaria and Austria. Both the operating expenses and the generated power are to be shared on a fifty-fifty basis by the Austrian and Bavarian groups of shareholders. There are already two power stations in existence on the Inn River frontier, and it is intended to transfer these two generating stations to the newly founded Austro-Bavarian company.

### Power Plan

To increase hydro-electric power supplies to the Italian State Railways, a partnership has been formed between the Societa Nazionale Cogne, the State Railways, and the Turin municipal electricity undertaking. It will develop and exploit the water power available in the Upper Aosta valley (east of Mont Blanc). Societa Nazionale Cogne, one of the most important semi-State concerns, with iron and steel works at Aosta, already produces electric power for its own use, and requires additional power. The main scheme, comprising barrage lakes and interconnected power stations in the Buthier region south of Aosta, is to be completed within five years. The completion of this scheme will enable the State Railways to proceed with the extension of electric traction in the north-west, including the electrification of the double-track Turin-Milan main line (95 route-miles) and the single-track line which branches at Chivasso and ascends to Aosta.

### State Boards Delay

Although a Central Electricity Authority for India has been formed, under the 1948 Electricity (Supply) Act, no State Electricity Board has yet been constituted, it was reported at a recent meeting of the Federation of Electricity Undertakings of India. In the normal course of events, these Boards should have come into being before September 10, 1950—two years from the date the Act was placed on the Statute Book—but an extension of time up to March 31, 1951, has been granted to the States. These Boards, when constituted, are to set in motion the consultative machinery for negotiations concerning operations with existing undertakings.

### Fan Industry Protection

The Government of India has decided to refer to the Tariff Board at Bombay, applications for protection or assistance received from the electric fan industry.

### Nationalisation

It has been announced in Lucknow that the Kanpur Electricity Supply Co., considered to be the second largest supply undertaking in Northern India, is shortly to be nationalised. Its annual output is approximately 12 million kWh. Cost of the acquisition is about 28½ million rupees, it is reported.

### Another Scheme

Work is about to start on the construction of a 30 kW electricity project in Bandipore Tehsil, about 40 miles from Srinagar, Kashmir. The idea of the project was mooted by the local co-operative society which proposed to the Kashmir Government the setting up of a power generator at a cost not exceeding Rs. 40,000, which the society had earned as profits for last year.

### Augmentation

Expenditure during the current year, considered by the Uitenhage Council last month, included £52,470 from the electricity fund for mains extensions in various parts of the town and industrial areas. This was in addition to a total of £29,270 for augmentation of existing mains. The town's electrical engineer, Mr. J. Mathews, had explained to the ratepayers that the present electrical system was inefficient and unable to carry the increasing load.

### Engineer's Report

Sir William Halcrow has arrived in Southern Rhodesia again, with a view to drawing up a report on the Kariba Gorge and Kafue River hydro-electric schemes. Later, he is going on to Nyasaland to study and report on proposed hydro-electric and irrigation schemes there.

### Supply Wanted

The Administrator has approved a projected scheme whereby the town of Brandfort will be supplied with electricity by the Bloemfontein Municipality. Further details of terms, etc., are asked for.

### Vierfontein

Work has started on the concrete foundations for the boiler house of the new Vierfontein power station of the Electricity Supply Commission of South Africa. It is expected that, unless there are unforeseen difficulties in the delivery of plant, the first 30 MW generator should be in commission in June, 1952. A further six generators are planned to go into operation at six monthly intervals, bringing the initial capacity to 210 MW. It will then be possible, according to existing plans, to add a further three sets if required. Preliminary work has also started at the Vierfontein Colliery, adjoining the power station site, from which fuel will be fed direct via conveyor belt to a coal preparation plant. The coal deposits, estimated at approximately 700 million tons, are extremely shallow, and comparatively easy to win.

# *PERSONALITIES*

## IN THE INDUSTRY

Interest will be aroused by the B.E.A. announcement in our Classified Advertisement section, seeking applications for the post of Divisional Controller. The explanation is that in the East Midlands Division, **Mr. W. S. Burge,** M.I.E.E., the controller, is to retire in the near future, although no date has been settled, we understand. At the end of 1951 a further vacancy will occur, **Mr. J. N. Waite,** C.B.E., M.I.E.E., F.Inst.F., the London Divisional Controller, also being due to retire.

The end of last month saw the retirement of **Mr. J. H. M. Nichols,** B.Sc., from the Turbine Sales Department of the British Thomson-Houston Co., Ltd., after just over thirty years service. Mr. Nichols was in Berlin with the A.E.G. in 1914, and interned during the First World War in Ruhleben Prisoner-of-War Camp as a civilian prisoner of-war, and shortly after his repatriation joined the B.T.H. Export Department.

*Mr. J. H. M. Nichols*

**Prof. R. O. Kapp,** B.Sc., M.I.E.E., has retired from the position of chief examiner for the A.S.E.E. Swann Diploma scheme, and the Council of the Association were unanimous in appointing **Dr. F. T. Chapman,** C.B.E., D.Sc.(Eng.), B.Sc., A.M.Inst.C.E., A.M.I.E.E., in his place as chief examiner.

An addition to the electrical personalities in the New Year's Honours List, noted last week, is **Mr. A. R. Driesson,** Eastern Area branch manager for British Insulated Callender's Cables Ltd. He has been awarded the O.B.E., in recognition of his valuable work in connection with the Air Training Corps, having carried out an amalgamation of all Ipswich squadrons, and later forming the Suffolk Wing, A.T.C., eventually being appointed district gliding officer for the Eastern Area, which position he still holds. He was also awarded the Cadet Force Medal last September.

The Minister of Fuel and Power has appointed **Prof. Sir Cyril Hinshelwood, Sir Claude Gibb** and **Col. H. C. Smith** to be members of the Scientific Advisory Council set up in 1945 to advise him on the scientific aspect of his statutory duties. **Dr. E. S. Grumell** and **Dr. H. Hollings** have retired from the Council. Prof. Hinshelwood is chairman of the Fuel Research Board. Sir Claude Gibb is chairman and managing director of C. A. Parsons and Co., Ltd., while Col. Smith, deputy-chairman of the Gas Council, was, before nationalisation of the gas industry, chief engineer and general manager of the Tottenham and District Gas Co.

Attracted by a desire to do "more social work," **Mr. H. E. Benson,** A.M.I.E.E., has accepted the position of manager of the Manton factory for the rehabilitation of ex-tuberculosis patients at Caernarvon. For the past four years, Mr. Benson has conducted a rural crafts industry in his cottage at Trunch, Norwich, we understand. He produced electric lamp standards from tops of trees found in the woods. He has had previous experience of rehabilitation work at a factory in Norwich.

**Mr. R. N. Cadbury,** B.A., has been appointed sales director of the E.M.B. Co., Ltd., and will be responsible for the internal Sales organisation.

We hear that **Sir John Kennedy,** O.B.E., M.Inst.C.E., M.I.E.E., who was acting chairman of the Uganda Electricity Board during part of **Mr. Westlake's** absence on leave, has now returned to this country. Shortly after Mr. Westlake's return Sir John was taken seriously ill and this delayed his departure, but we are pleased to know that he is now making good progress.

**Dr. T. J. Lewis,** B.Sc.(Eng.), Ph.D., has been elected to the W. T. Henley Fellowship for research work in electrical engineering at Queen Mary College, London University.

Electrolux Ltd. announce the retirement of **Mr. C. Lindberger** from the position of general works manager. Mr. Lindberger has been associated with that concern for over 25 years, of which he spent 23 at the Luton works. He is not entirely severing his connection with the company as he is remaining in a consultative capacity for the time being. He is succeeded as works manager by **Mr. W. R. Lackie,** A.M.I.E.E., who has been assistant works manager since he joined the company in 1947. Mr. Lackie served a college apprenticeship with Metropolitan-Vickers Electrical Co., Ltd. and remained with that organisation until he joined Electrolux.

*Mr. C. Lindberger*

*Mr. W. R. Lackie*

Recently appointed managing director of Electronic Tubes, Ltd., is **Mr. Bruce Wilkinson,** B.E., A.M.I.E.(Aust.), who was previously commercial director of E.M.I. Factories, Ltd., whom he joined after coming to this country from Australia in 1946. He still retains his seat on the board of E.M.I. Factories, Ltd. Prior to coming to Britain, he was with Amalgamated Wireless Australasia, Ltd., for 16 years, and for some of the time was in control of the research laboratories at that firm's Ashfield works.

*Mr. Bruce Wilkinson*

The Minister of Fuel and Power has re-appointed the following part-time members of Area Electricity Boards:—

**London.**—Alderman C. W. Dixon, J.P.; Mrs. George Dunbar, O.B.E.; Dr. P. Dunsheath, C.B.E., M.A., D.SC., M.Inst.C.E., M.I.E.E., F.Inst.P.; Mr. G. Eley, C.B.E., M.A.; Mr. W. A. Jones, A.M.I.E.E.; and Mr. W. J. H. Wood, M.I.E.E., M.I.Mech.E.

**South Eastern.**—Mr. George Humphreys and Ald. E. Simms.

**Southern.**—Ald. J. P. D. Lacey, O.B.E., J.P.

**South Western.**—Mr. H. M. Medland.

**Eastern.**—Capt. J. M. Donaldson, M.C., M.Inst.C.E., M.I.E.E.; Mr. W. J. Humphreys, J.P.; and Sir Cecil Oakes, C.B.E., J.P., LL.M.

**East Midlands.**—Mr. J. T. Graham, A.R.T.C., M.I.Mech.E.; Ald. A. Joyce, C.B.E., J.P.; and Mr. G. H. B. Wilson, C.B.E., M.C., A.F.C., J.P.

**Midlands.**—Cnclr. A. E. Bennett, J.P.; Mr. S. F. Burman, M.B.E.; and Capt. L. H. Green, M.B.E., D.L., J.P.

**South Wales.**—Sir Gerald Bruce, K.C.B., C.M.G., D.S.O.; Mr. Basil Curran; Ald. T. Evans, J.P.; and Principal Robert James, wh.sch., D.I.C., A.M.I. Mech.E., A.R.C.S.

**Merseyside and North Wales.**—Mr. J. A. Duncan, B.SC.; Ald. A. Hewitt, O.B.E., D.L., J.P.; Mr. G. K. Paton, M.I.E.E.; and Sir Arthur Pickup.

**Yorkshire.**—Mr. H. F. Sherbourne, M.C., M.A.

**North Eastern.**—Cnclr. Miss N. Balls, J.P.; and Mr. C. I. C. Bosanquet, M.A.

**North Western.**—Miss N. Kenyon; Ald. H. E. Rhodes, J.P.; and Col. J. S. A. Walker, T.D., J.P., M.Inst.C.E., M.I.Mech.E.

**South East Scotland.**—Mr. R. W. McCrane, M.C., B.SC.(Eng.), A.M.Inst.C.E.; Mr. George McLaren, C.B.E., J.P.; Sir Ronald Thomson; and Sir Ernest Wedderburn, O.B.E., D.L., D.SC., LL.D.

**South West Scotland.**—Col. J. G. Crabbe, O.B.E., M.C., D.L., J.P.; Mr. J. B. Mavor, M.I.E.E., M.I.Mech.E.; Mr. Jackson Millar, C.B.E., J.P.; Mr. George Morgan, M.I.E.E.; Mr. Thomas Murray, J.P.; and Cnclr. J. Sullivan.

We learn that **Dr. W. Snellen,** director of the North Holland Electric Power Co., Bloemendaal, who is well known to the electrical industry in this country, retired at the end of last year.

Joining Lancashire Dynamo and Crypto originally in 1938, **Mr. A. W. Reading,** A.M.I.E.E., has recently been appointed to the London Sales Office staff of that organisation. After war service, during which he won the M.C., he returned to Willesden Works of L.D.C. in 1947.

The New London Electron Works, Ltd. announce that **Mr. Felix L. Levy,** who has for many years served on the board, has been elected chairman and managing director of the company. In this office he succeeds his father, the late Mr. Lawrence Levy. Also, **Mr. W. Clarke,** general manager of the company since 1943, has been elected to the board.

Recently appointed executive engineer on the Snowy Mountains Hydro-Electric Authority, Australia, **Mr. W. H. T. Parr,** M.I.E.E., D.F.H., sails from this country in the s.s. *Maloja* for Sydney on Wednesday next, January 17. He is well known in the industry, having previously been manager of the Birmingham office of Highfield and Roger Smith, the consulting engineers, with which firm he has been associated for the past fifteen years.

*Mr. W. H. T. Parr*

**Mr. H. L. Satchell,** M.B.E., director and manager of the Rugby Works of the British Thomson-Houston Co., Ltd., has been elected President of the Engineering and Allied Employers' Leicester and District Association. Mr. Satchell has been a member of the Association for some 15 years, and last year was vice-president.

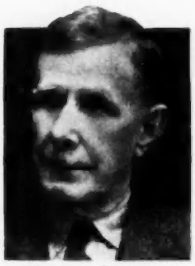
Prior to the commencement of the Sunco Social and Sports Club's Christmas party, the directors presented gold watches to 23 members of the staff having more than 25 years' service. The presentations were made by the joint managing directors, **Mr. E. J. Beaver** and **Mr. R. J. Rawlings.** Longest service was that of **Mr. A. G. Owen** (director responsible for the installation accessories side of the company's business), with 44 years, followed by **Miss V. M. Cresswell** with 36 years. Four of those presented had more than 30 years and 17 more than 25 years' service.

Ekco-Ensign Electric Ltd. have appointed **Mr. D. B. Francis** as representative in the south-west Wales area. He was for five years previously employed by Veritys Ltd. as their Sales Engineer in South Wales. Mr. Francis will operate from the company's Cardiff office at 50 Bridge Street.

*Mr. D. B. Francis*

Newly appointed director and secretary of the British Standards Institution is **Mr. H. A. R. Binney,** C.B., B.SC.(ENG.), who was, until recently, Under-Secretary at the Board of Trade. He succeeds the late Mr. Percy Good, C.B.E. Mr. Binney gained early engineering training at the City Guilds (Engineering) College, and entered the Board of Trade in 1929. He has had experience in the Patent Office as an examiner, and since 1932, in administrative grades of the Civil Service, during which time he has had close contact with many branches of United Kingdom industry. In 1944 he became head of the first Engineering Division of the B.o.T., and has subsequently served as the chief U.K. representative at various international conferences.

A well-known personality at B.T.H. Rugby, **Mr. J. J. Scrivener** was recently presented by the directors of the company with an armchair and settee to mark the completion of fifty years' service. Mr. Scrivener, who will be 79 next month, was in charge of the Wiring Department from 1909 to 1934, since when he has been head of the employees' sales counter. Among his many other activities has been a close association with the amateur dramatic society and the recreation club.



*Mr. J. J. Scrivener*

The following changes of designation and appointments are announced by the British Aluminium Co., Ltd.: **Mr. G. W. Lacey** has relinquished his title of director and general sales manager and assumed the designation of director in charge of sales; **Mr. R. G. H. Linzee** has relinquished the title of director and general establishment manager and assumed the designation of director in charge of establishment; **Mr. G. A. Anderson,** formerly deputy general sales manager, is now general sales manager and assumes responsibility for the routine work of the sales division of the company. It is not intended to appoint a deputy general sales manager, we understand; **Mr. H. H. Cundell,** previously sales manager, is now home sales manager, following the formation of a separate export sales department. The company has also made two other appointments: **Mr. P. J. Ferguson,** manager of the Scottish branch office, has been appointed export sales manager at the head office in London; and **Mr. M. J. J. Richards,** of the Midland branch office, has been appointed manager of the Scottish branch office, in place of Mr. Ferguson.

## OBITUARY

We hear of the death, on December 25, of **Mr. J. E. Peover,** aged 49, superintendent of electrical erection, Outside Department, the English Electric Co., Ltd. He joined that company as an apprentice in 1917. Subsequently he travelled extensively, making several visits to France and South Africa. In 1936 he went to Warsaw for testing and commissioning switchgear and rectifier plant for the Polish State Railways. During the war he was sent to Malta for the installation of the underground power station and rectifier substation at the Naval Dockyards.

We regret to record the death, on January 2, of **Major G. C. Milnes,** M.C., M.I.E.E., aged 67, who was city electrical engineer at Lancaster for 37 years of his 42 years service with that undertaking. He retired in March 1948.

The death occurred recently of **Mr. J. A. Sweetlove,** aged 52, senior electrical engineer with Imperial Chemical Industries Ltd., for ten years.

The death has occurred of **Mr. C. A. Holbrow,** aged 87, who was concerned with many of the early electricity installations. Educated at Uppingham, he later studied electrical engineering, and from 1886 to 1888 worked on the installation of electric light at Paddington station and hotel, London. He then joined the Metropolitan Electric Supply Co. In 1901 Mr. Holbrow went to Australia and installed electric light in Kalgoorlie. Later he went to Amsterdam and played a prominent part in inaugurating the tram system there. In 1904 he joined C. A. Parsons and Co., Ltd., with whom he served till retiring in 1934.

**Mr. David R. Lewis,** deputy superintending civil engineer on the Tummel-Garry hydro-electric scheme of the North of Scotland Hydro-Electric Board, died at Pitlochry last week-end, aged 38.

We note the recent death of **Mr. B. A. Smith** aged 67, who was for 40 years on the staff of the City of Gloucester Electricity Department, retiring in January, 1946, from the position of distribution engineer.

Another of the old borough electrical engineers has gone—**Mr. J. F. Simpson,** M.I.E.E., M.I.Mech.E., died on January 1, aged 81. He was associated with Preston from 1904 until retiring in August, 1934. He went to Preston originally as assistant tramways engineer and manager, and in 1905 was appointed tramways engineer and manager. When the Corporation purchased the local electricity supply undertaking from the National Electric Supply Co., Ltd., in 1922, Mr. Simpson became the borough electrical engineer, relinquishing his post as tramways manager.

We note the death, on January 5, of **Mr. E. M. Malek,** M.I.E.E., aged 78, who had considerable experience with railway electrification schemes. At one time he was assistant chief engineer of the Central London Railway Co. He also served with the British Thomson-Houston Co., Ltd., the English Electric Co., Ltd., and British Insulated Callender's Cables, Ltd.

The death occurred on January 4th of **Mr. R. C. Brookes,** B.A., A.M.I.E.E., lecturer in electrical engineering at Liverpool University.

# Network Conversion

## The Application of the Star-to-Delta Formula

Discussed by G. W. Stubbings, B.Sc., A.M.I.E.E.

IT is well known that a set of three delta connected impedances in a network can be replaced by an equivalent set connected in star, such that the total impedance between any two external points of the network remains unchanged. Similarly, a star-connected set can be replaced by an equivalent set connected in delta. The delta-to-star conversion is most used in network calculations. The star-to delta is interesting because it affords a convenient method of studying 3-phase star-connected loads. If two sets of three impedances, the one star connected, and the other, equivalent and delta-connected, are joined to the same 3-phase supply, they will take from it equal line currents and equal amounts of power at the same 3-phase power factor. The formula for the delta-to-star-to-delta conversion is very simply stated. If $Z_A$, $Z_B$ and $Z_C$ stand for the vectors of the impedances joined respectively to terminals A, B and C, the vector of the component of the equivalent delta-connected set, $Z_{AB}$, which is joined to terminals A and B is $Z_A Z_B Y$ where Y stands for the vector sum of the admittances of the three star-connected components. The formulae for the vectors $Z_{BC}$ and $Z_{CA}$ are symmetrical.

### Star-Delta Equivalents

Fig. 1 (*a*) shows a star-connected arrangement of two 1 ohm non-inductive resistors and a resistance-free inductor having an impedance of $n$ ohms, represented algebraically by $jn$. The admittance of the inductor is $-\frac{j}{n}$, so that the vector sum of the three admittances is $2-\frac{j}{n}$. The values of the impedances of the equivalent delta are easily seen to be as marked in Fig. 1 (*b*). The star arrangement corresponds to that used in the Varley phase sequence test. As the impedances $Z_{AB}$ and $Z_{BC}$ are equal, the currents in the delta from terminal B when the arrangement is connected to a balanced voltage 3-phase supply are also equal. Let, I stands for these equal currents and V for the line voltage. The numerical value of the $Z_{AB}$ and $Z_{BC}$ impedances is $\sqrt{(4n^2+1)}$ ohms, that of the $Z_{CA}$ impedance is $\frac{\sqrt{(4n^2+1)}}{n}$ ohms. The current in $Z_{CA}$ of the delta is therefore $n$I. The phase angle of the impedances $Z_{AB}$ and $Z_{BC}$ is arc tan $2n$ leading, and that of $Z_{CA}$ is arc tan $\frac{1}{2n}$ lagging. The difference of these phase angles is therefore 90°. Delta currents I and $n$I combine at terminal A with a phase difference of $60-90=-30°$ to give $I_A$ the current in the star component $Z_A$. The same currents combine at terminal C with a phase difference of $60+90=150°$ to give $I_C$ the current in $Z_C$. Hence the current in the resistor connected to the lagging phase A is greater than that in the resistor connected to the leading phase C.

### Varley Test

The delta currents combining at terminals

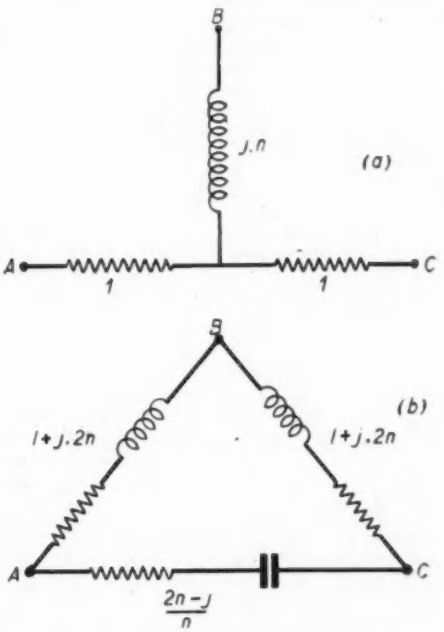



*Fig. 1. Equivalent Star and Delta Values*

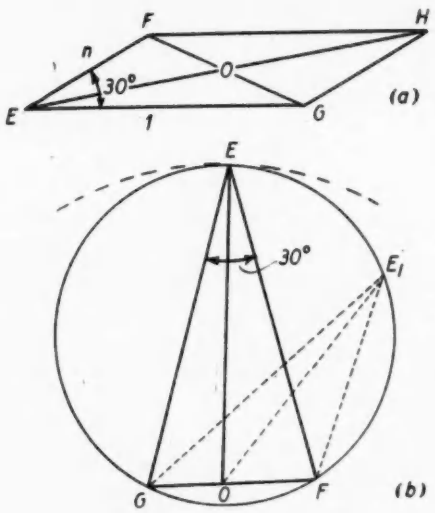



*Fig. 2. Conditions for Varley Test*

A and C have a ratio of $n$, and they have phase differences of 30 and 150 degrees respectively. The resultant currents in the star are therefore represented to scale by the diagonals of the 30 degree parallelogram of Fig. 2 (*a*), the adjacent sides of which have the ratio $n$. What is the value of the ratio $n$ that makes the ratio of these diagonals a maximum, and which gives the maximum ratio of the lamp voltages in the Varley test? As the diagonals of the parallelogram bisect each other, so that EO is the median of the triangle EFG, this question is the same as: given the base of a triangle and the vertex angle of 30°, what is the shape that gives the greatest median? Fig. 2 (*b*) shows that the median is the greatest when the triangle is isosceles, for all triangles satisfying the specification are circumscribed by the same circle, the centre of which lies in the isosceles triangle. The median of this triangle is perpendicular to the base. Hence the diagonals of the parallelogram of Fig. 2 (*b*) have their maximum ratio when they are mutually perpendicular and when $n=1$. The lengths of these diagonals are then $\sqrt{(1+1+\sqrt{3})}$ and $\sqrt{(1+1-\sqrt{3})}$. The maximum ratio of the A and C line currents, or $\frac{I_A}{I_C}$ is therefore $\sqrt{\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}\right)}=\sqrt{(2+\sqrt{3})^2}=2+\sqrt{3}=3{\cdot}73$. $I_A$ is then $\sqrt{(2+\sqrt{3})}$ times the current in $Z_{AB}$ or $\sqrt{(2+\sqrt{3})}\times\frac{V}{\sqrt{15}}$ and as $Z_A=1$ ohm, the voltage in $Z_A$ when $n=1$ is $V\sqrt{\frac{(2+\sqrt{3})}{15}}=0{\cdot}86V$.

When a voltage V is impressed on an impedance of Z ohms the resistance and reactance of which are respectively R and X, the power dissipated is $\frac{V^2R}{Z^2}$ and the VAr consumption is $\frac{V^2X}{Z^2}$. If V is the line voltage of the supply to which the delta and star arrangements are connected, then as the resistances of $Z_{AB}$, $Z_{BC}$ and $Z_{CA}$ are respectively 1, 1 and 2 ohms, the corresponding power consumptions are $\frac{V^2}{4n^2+1}$, $\frac{V^2}{4n^2+1}$ and $\frac{2n^2V^2}{4n^2+1}$ so that the total power consumption, P, is $\frac{2V^2}{4n^2+1}(1+n^2)$. Similarly, the reactive consumptions are $\frac{2nV^2}{4n^2+1}$ and $\frac{2nV^2}{4n^2+1}$ inductive, and $\frac{nV^2}{4n^2+1}$ capacitative, and the resultant VAr consumption, Q, is $\frac{3nV^2}{4n^2+1}$. These power and VAr consumptions in the delta are the same as those in the star arrangement. If $\cos\Phi$ is the 3-phase power factor of the unbalanced supply to the star arrangement, then $\cot\Phi=\frac{P}{Q}=\frac{2}{3}\left(\frac{1+n^2}{n}\right)$ and $\cos\Phi$ will have its minimum value when $\cot\Phi$ is a minimum, or when $\left(\frac{1}{n}+n\right)$ has its smallest value. In this condition $n=1$ and the minimum value of $\cot\Phi$ is $\frac{4}{3}$, from which it follows immediately that the corresponding minimum value of $\cos\Phi$ the 3-phase power factor is $\frac{4}{15}=0{\cdot}8$ and this minimum occurs when the ratio of the currents in the resistor branches of the star arrangement is a maximum.

The results deduced above can be established by direct methods, but the algebra is rather complicated. The foregoing calculations show how considerable simplification can be obtained by making use of the star-to-delta conversion.

# SYNTHETIC MICA

## *Research Carried out by U.S. Bureau of Standards*

By MICHAEL LORANT

THE successful synthesis of mica by scientists of the U.S. Bureau of Standards was first recorded in the ELECTRICAL TIMES for January 19, 1950, and it is now possible to give further information regarding the process.

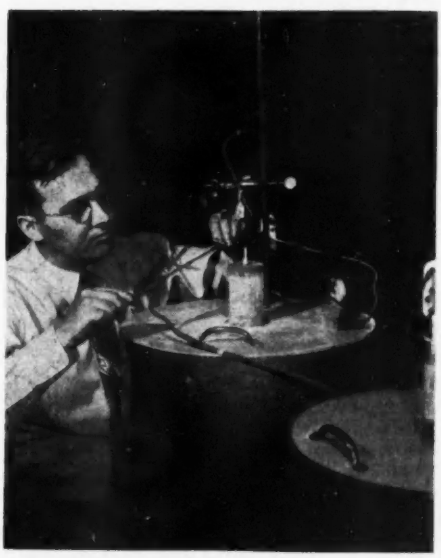
The synthetic material, successfully produced by Dr. Herbert Insley, Alvin Van Valkenburg, and Robert Pike, all of the Bureau, has essentially the same properties as natural mica but is superior to the natural substance in its ability to withstand high temperatures.

This work is part of a broad programme of research on fluorine-type artificial minerals carried on by the U.S. National Bureau of Standards under the sponsorship of the U.S. Office of Naval Research. The synthetic mica phase of the Bureau's programme, sponsored and co-ordinated by the U.S. Office of Naval Research, has been carried out in co-operation with the U.S. Bureau of Mines and the Colorado School of Mines.

### *Materials*

The synthetic material has four ingredients, three being common materials sometimes used in making glass: quartz, magnesite, and bauxite. The fourth—a fluorosilicate compound—is added because it acts as a crystallising agent. It is the presence of this fourth ingredient which makes the synthetic material superior to natural mica in resistance to breakdown in high-temperature applications.

*Flakes of synthetic mica being examined for structural defects and gas bubbles*



*Connecting the thermocouples prior to placing the crucible in the furnace*

In its natural state mica is the result of a long process involving extremely high pressures and temperatures. For safety and convenience, such high pressures are undesirable in laboratory or production processes. The Bureau's goal was, accordingly, to synthetise mica satisfactorily at normal atmospheric pressure. Here fluorine proved to be a successful crystallising agent. Although natural fluorine is poisonous and difficult to control, a group of synthetic fluorine compounds—the fluorosilicates—provided a convenient and safe way of introducing fluorine into mica synthesis.

In producing synthetic mica, the four powdered ingredients are placed in a platinum-lined crucible and melted in an electric furnace at a temperature of nearly 2,500 degrees Fahrenheit. As the furnace cools, mica crystals grow from a tiny seed at the bottom of the crucible. Ordinarily, the individual crystals form groups oriented in many different directions. For mass production, however, the mica crystals should be formed in parallel sheets. The key to this seems to be precision control of temperature differences within the crucible.

D

# NEW LITERATURE

### *Power System Interconnection*

*by H. Rissik, B.Sc.(Eng.), A.M.I.E.E.*

ONE particular aspect of power system interconnection is the concern of Mr. Rissik in this volume, and that is the solution of the transmission problems that arise when considering such interconnection in practice. The basic tools for this work are discussed in the first chapter, and the author then proceeds to describe the place of circle diagrams in transmission studies. The analytical method is applied in subsequent chapters which deal with steady state and transient stability, and the book concludes with a discussion of those factors which limit a.c. transmission.

Theory takes a second place in this work, though it is given sufficient space to allow the methods described to be appreciated. Throughout the accent is on the details of calculation, and these are admirably and fully presented, and are backed by some useful charts of hyperbolic quantities. Published by Pitman, 239 pages, 8½ in. by 5½ in. Second edition, price 25s.

### *Direct Current Motor Manual*

*H. S. Dusenberg*

VALUABLE practical hints on motor selection and maintenance are backed throughout this excellent book by sufficient theory to make the advice intelligible. Its one drawback for the British engineer is its American origin—some of the valuable tabular matter, such as that on brush and bearing standards, and the summary of safety rules is of very limited use here. Nevertheless, much is left that will be warmly welcomed by all who have to run d.c. motors. Notes on the installation and care of the various component parts of such machines are followed by a discussion of the types available and their characteristics, and to selection problems generally. Then comes a long series of chapters on control gear and operator, including information on electronic control and special d.c. machines. Altogether this is an admirably presented reference book for the industrial engineer. Published by Macmillan and Co., Ltd. 275 pp., 8¼ in. by 5¼ in. Price 26s.

### *The Electrical Handbook for Women*

*edited by Dame Caroline Haslett, D.B.E.*

FEW changes have been made in this fifth edition of this proved electrical textbook for the domestic user. A foreword explains that the occasion of its preparation was the setting up of the B.E.A., which necessitated complete rewriting of sections on electrical legislation and on the structure of the industry. Elsewhere, only the greater advances in technique, such as the growth in the application of fluorescent lighting, have been taken into account by additional matter, and a fundamental revision has been left for a future edition.

The handbook splits into three parts, all simply written, yet technically accurate. First comes a review of the general principles of electricity, including notes on the theory of the more common apparatus and machines. Two chapters on law and tariffs make up the second section, and they are followed by a more comprehensive treatment of practical domestic applications of electricity. Published by the English Universities Press, 481 pages, 6¾ in. by 4¼ in. Fifth edition, price 10s. 6d.

### *Practical Electrician's Pocket Book 1951*

IN its 53rd year of publication this well-known reference manual retains its accustomed format, with an increase in the number of pages. Amongst modifications are noted a full revision of the wiring and installation section, taking account of the 12th edition of the I.E.E. regulations, and a new chapter on electricity in motor vehicles. Other new chapters deal with the maintenance of cookers and with rectifiers and convertors. That particularly valuable feature, the mains voltage table, has been completely revised, and contains some 5,000 entries. Published by Electrical and Radio Trading, 550 pages, 5¼ in. by 3½ in. Price 5s.

## BOOKS RECEIVED

**The Nomogram**, by H. J. Allcock and J. R. Jones. Comprehensive textbook. Published by Pitman. 238 pp., 8½ in. by 5½ in. Fourth edition. Price 18s.

**Diesel Engine Manual**, edited by E. Molloy. Practical handbook of stationary and automobile machines. Published by George Newnes. 212 pp., 9 in. by 6 in. Price 15s.

**Technical Data on Fuel**, edited by H. M. Spiers. Tables and information. Published by World Power Conference—British National Committee. 515 pp., 7¼ in. by 4½ in. Fifth edition. Price 25s.

**Industrial Electrical Plant Maintenance**, by E. G. Anners. Details of maintenance practice. Published by Pitman. 191 pp., 8½ in. by 5½ in. Price 27s. 6d.

**Atomic Energy for Laymen**, by Sir Arthur Dixon. General review with bias to Civil Defence problems. Published by Chantry Publications Ltd. 221 pp., 7¼ in. by 4¾ in. Price 8s. 6d.

**Radar Simply Explained**, by R. W. Hallows. Non-technical. Published by Chapman and Hall, 190 pp., 7¼ in. by 4¾ in. Second edition. Price 10s. 6d.

**Electrical and Radio Dictionary**, by C. H. Dunlop, E. N. Haan and L. O. Gorder. American authors. Published by The Technical Press Ltd., Gloucester Road, Kingston Hill, Surrey. 133 pp., 8 in. x 5 in. Price 14s.

# *The* BUYER'S *Column*

## Festival Floodlights

NO doubt dealers will soon receive a flood of enquiries for floodlighting equipment in preparation for the opening in May of the Festival of Britain. With this point in mind, the GENERAL ELECTRIC CO. LTD., Magnet House, has designed two new floodlights which have been introduced just recently. They will be appropriate where an inexpensive yet efficient installation is required.

The first (F.69042) is a wide-angle type suitable for close offset, using an "Osram" Class B1 500 W or 1,000 W lamp. Body is made from sheet steel, rustproofed and stove enamelled; the reflectors are of electro polished, anodised aluminium. The frame of the toughened glass cover plate is so constructed to permit adequate ventilation but at the same time preclude the ingress of water.

The second lantern (F.69023) uses an "Osram" 500 W or 1,000 W G.L.S. lamp. It is suitable for larger offsets. In this case the spun aluminium body is anodised and electro-brightened on the interior to form a reflector. A cast aluminium housing encloses the lampholder. Cover glass is a flat toughened plate.

## Indeed a "Micropak"

BONOCHORD LTD.'s latest design is the "Micropak II," a miniature one-piece hearing aid, weighing only 5 ozs. complete with batteries. Its size is $3\frac{1}{4}$ by $2\frac{7}{32}$ by $\frac{3}{4}$ in.

A wide range flat response crystal microphone is concealed behind a decorative grille and is recessed to avoid "clothes rub." Volume control is of the drum type, with an independent selector switch. The case is in satin finish jeweller's gold.

Three stages of amplification give a maximum air-to-air gain of 55 db. Overall response curve is sensibly flat with either crystal or magnetic receivers for air or bone conduction.

*The Micropak II*

The Bonochord low drain circuit gives 350 hours of serviceable life from a 15 V "Ever Ready" B.121 h.t. battery with 10 hrs. l.t. life from a 15 standard "pen" cell, and the chassis is replaceable in one minute. Retail price is 30 guineas with 12 months' free service guarantee.

## The "Electric Bobby"

FOR protection against unwelcome intruders, householders are now fitting the "Electric Bobby," a combined safety chain and burglar alarm, which is being marketed by the JEARY ELECTRICAL CO. LTD., 5 Lambs Bldgs., Bunhill Row, London, E.C.1.

Retailing at 12s. 6d. (no purchase tax), the device is in effect a door chain with a contact in the socket which is connected in circuit with the normal door-bell circuit. Any pressure on the chain will make the circuit, causing the bell to ring, whilst at the same time the chain remains in position to preclude the entry of the felon.

Easy to install, the "Electric Bobby" is available for left- or right-hand doors and in domestic and heavy duty industrial models.

## Pull-cap Distribution Gear by A.T.L.

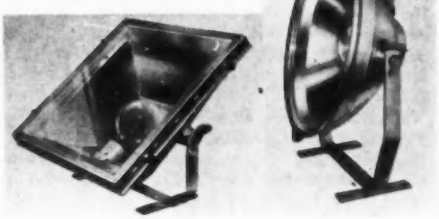
AVAILABLE from AUSTIN TAYLOR ELECTRICAL LTD., Ellesmere St., Failsworth, Manchester, is a range of sturdy, efficient distribution and switch gear. Interesting example is the series of pull cap distribution fuse boards for s.p. & n., d.p., t.p. or t.p. & n. circuits up to 12 in number both in 30 amp and 60 amp sizes.

This range of distribution fuse boards is equipped with pull cap 440 V fuse fittings complying with BS. 88/1947. The fittings are designed for use with "Reyrolle" fuse links of category AC4 for 440 V.

Cases are of heavy gauge steel welded construction of rigid design, the doors are dust-proof and secured by wing fasteners. These doors are so designed that they can be opened left or right-handed as desired. All live parts are completely shielded and the spare fuse rack and circuit label in an easily accessible position on the inside of the door.

Removable undrilled end plates are standard although provision for isolators, glands, sealing chambers or conduit holes can be included as required. Standard finish of the unit is in durable grey enamel.

*G.E.C.'s Festival Floodlanterns*



## More Price Adjustments

FOLLOWING closely upon price adjustments announced by them on December 6 last year, the GENERAL ACCESSORIES Co., Ltd., Barton Hill Works, Bristol 5, again find themselves committed to a general increase on catalogue prices of 10% on prices in the 1949 catalogue as amended by circulars of May and September, 1950.

There are exceptions set out as under: The "Surrey" range of switches, etc., shown on pages 12-15 and 24; the "Footpress" switch socket outlets described on page 25, which remain as at present; and the following lines which are specially priced. "Clix" 2 pin plugs "M" type, Catalogue No. 4466, Black/Brown, 7s. 7d. per doz; 4466, coloured, 9s. per doz.; 4416, Continental, 10s. per doz.; 6016 Bijou switched adaptors, 33s. per doz., and 6056, 2 pin to BC adaptors, 20s. per doz.

New price lists received from NETTLE ACCESSORIES LTD., Harper Road, Wythenshawe, Manchester, and UNITY HEATING LTD., Chilworth Manor, Southampton, Hants, cancel previous lists and embody price increases. Nettle Accessories' List No. 22 is dated January 1 and consolidates all price amendments and includes the prices of recent additions to the "Nettle" range of products, whilst Unity Heaters new list has been issued with prices now incorporating a 10% increase.

## An Oil-filled Electric Towel Rail

AN up-to-date good-looking bathroom fitting now on the market is the "Samtilec" towel rail which is made by S. TIMINGS & Co., LTD., 88 Hamstead Road, Birmingham 19.

Made from 1¼-in. heavy gauge copper tube chrome plated the towel rail incorporates a special heater rated at 100W. The prices are economical too. For the No. 1 (3 ft square) size price is £10 15s. plus purchase tax, whilst the No. 2 size (3 ft × 2 ft 6 in.) costs £10 5s. plus purchase tax.

## An Advance in Fan Manufacture

THE technique in design and manufacture of the "Aerofoil" range of fans may be considered a major stride forward in the development of axial flow fans on a modern engineering production basis.

In this Aerofoil range made by WOODS OF COLCHESTER, LTD., an associated G.E.C. company, Braiswick Works, Colchester, Essex, the fan impellers and motors have been designed as a family.

The whole range is geometrically similar and each unit has identical characteristics so that all volumes and pressures are covered in smooth steps.

Frame diameters of the motors conform with the impeller hub sizes, being produced as integral parts of the fans. In each motor diameter a wide selection of speeds and horse powers is available, 3 ph., s.ph., d.c. and flameproof motors all being designed to conform to the same frame sizes.

There are nine sizes of single-stage fans from 6 in. to 48 in. diameter. The adjustable impeller is fitted to sizes from 15 in. upwards; the smaller sizes having solid cast impellers. There is also a range of dual duty, two-stage fans with contra-rotating impellers giving 2½ times the pressure of single-stage units without proportional increase in noise. The air rotation created by the first stage impeller is corrected by the second impeller and the rotational energy which is normally wasted power is converted into static pressure for doing useful work.

## A New Chilton Earth Leakage Trip

NOW being marketed by CHILTON ELECTRIC PRODUCTS LTD., Hungerford, Berkshire, is a new earth leakage trip. Similar to the company's existing model, this new product retails at 33s. It does not, however, incorporate the thermal and magnetic overload protection of the earlier model, which will continue to be marketed as a standard line.

# TRADE PUBLICATIONS

RADIO AND ELECTRONIC PRODUCTS. The company's range is surveyed in a booklet issued by the Automatic Telephone and Electric Co., Ltd., Strowger Works, Liverpool 7. It is No. 1149.

UNIT HEATERS. The advantages of Harris unit heaters by the Harris Engineering Co., Ltd., York Wks., Browning Street, London S.E.17, are summarised in a recent leaflet.

CROP DRYING.—An attractive brochure issued by Woods of Colchester, Ltd., an associate company of the G.E.C., Ltd., surveys the usefulness of the company's products in the drying of crops for storage and the provision of fodder for the farm stock.

ELECTROSTATIC PRECIPITATION. — Publication 7005 issued by the Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4, supersedes No. 7002. It deals with the plant made by the company.

ELECTRIC COOKERS.—A well-produced leaflet issued by Carron Co., Carron, Falkirk, gives details of their "H" series of cookers.

WATER HEATING.—An attractive loose-leaf brochure has been issued by Simplex Electric Co., Ltd., Oldbury, Birmingham, which according to its title deals with "Creda Hot Water."

SUBMERSIBLE PUMPS.—Details of the Sumo pump—"The pump which gets down to it"—are set out in a booklet issued by Chance Bros., Ltd., 28 St. James's Square, London, S.W.1.

ELECTRIC COOKER.—A strong "weather-proof" counter sales aid depicting one of the modern "Xcel" cookers has been issued by Elexcel Ltd., Broad Green, Liverpool.

MOTOR STARTERS.—List 18850 details the "Barlecta" push button direct on line motor starter supplied by Barries Electrical Agencies, Ltd., King Street, Brighton 1.

# THE WEEK

## INDUSTRY *in news* COMMERCE

### *Ban on Advertisement Lighting*

ADVERTISEMENT lighting which involves the use of electricity, gas, oil or candles has been banned by the Advertisement Lighting (Prohibition) Order, 1951, which came into force last Monday. Only exceptions to the order are the use of electricity obtained from windmill generators and electricity for the projection of films and slides in theatres or cinemas. Announcing this last weekend, the Minister of Fuel and Power said the object of the order, which covers shop-window lighting, was to save coal.

Previously, the use of electricity from public supply for advertising was restricted only between 7 a.m. and 6 p.m. from Monday to Friday, but now the restrictions not only apply to all times but have also been extended to other fuels. The use of oil and candles has been prohibited to prevent the possibility of a shortage in those commodities.

### *Council appeal against B.E.A. Refusal*

THE B.E.A. has informed the Eastern Electricity Board's Consultative Council that they will not alter the decision to enforce the tariff adjustments recommended for the Area last year. The chairman, Ald. W. J. Bennett announced this at the meeting of the Council last Friday, and added that the B.E.A. had also refused to receive a deputation from the Council as "no useful purpose could be served" by such a meeting. It will be remembered that in October the Consultative Council objected to the immediate enforcement of the tariff adjustments and decided to make representations to the B.E.A. (see our issue of Nov. 2). Under the provisions of the Electricity Act the Council is entitled to pursue such matters with the Minister of Fuel and Power and accordingly representations have been made to the Minister. No reply had yet been received but Ald. Bennett said he anticipated an early answer.

The next meeting of the Council will be on March 2, but should any developments take place prior to that date, the chairman said he would summon a special meeting immediately. Although March 2 follows the date fixed for the enforcement of the new tariff charges it will still precede the first quarterly meter reading.

There was also a lengthy discussion on load shedding at Friday's meeting and all members were agreed that the remedy was unknown apart from the fundamental solution of providing new generating plant. Ald. Bennett recalled that industrial consumption now equalled that of 1943 but domestic consumption had risen by 100%. Many complaints, he said, had been received from hospitals and similar institutions and in all cases he had advised the installation of auxiliary plant. He continued by saying that all large organisations had to face power failures whether there was a shortage or not, and consequently it was essential that alternative supplies should be available. But, the chairman added, the last thing the B.E.A. wanted, was to find that everyone had their own power supply when electricity became more plentiful. A resolution was passed urging that where auxiliary plant was available it should be used to assist the load-shedding problem.

### *Rationing of Sulphur*

AS a result of reductions in the import of sulphur into this country from the U.S., the Board of Trade has announced that the consumption of sulphur will in future be restricted. While the manufacture of sulphuric acid from raw materials other than sulphur will not be affected, the distribution of all acid produced will have to be controlled, and accordingly a system of rationing has been instituted for the distribution of sulphur and sulphuric acid. The two orders made by the Board prohibit the supply of over five tons of sulphuric acid per quarter to any one person, unless a licence has been obtained. They also prohibit the consumption of sulphuric acid and of crude sulphur except under the authority of a licence. Supply of processed sulphur in quantities under 56 lb. per month is not affected.

The two orders, which are operative as from last Monday, are the Control of Sulphuric Acid Order 1950, and the Control of Sulphur Order 1950, and may be obtained from H.M.S.O. price 1d. each.

### *The First Half-Century*

The mothers and children of men employed at Messrs. Cromptons works had their annual Christmas treat on Sunday last, when 200 mothers and 600 children assembled at the Corn Exchange. A tea fight opened the proceedings, then came a variety entertainment including a cinematograph and a lantern show of war pictures by Colonel Crompton. The event of the evening, however, was the Baby Show. Mr. and the Misses Crompton and Mrs. Brunton officiated as judges.—*From our issue of January* 10, 1901.

## *Improvements at C.I.G.R.E.*

WE learn that important developments are being planned in connection with the 1952 C.I.G.R.E. Conference at Paris, and these will satisfy many of the criticisms made at the 1950 conference. It is proposed that simultaneous translations will be provided in English and French through headphones available to delegates, and that each person on the platform will be provided with an individual microphone.

For the comfort of delegates an improvement in ventilation of the meeting rooms is planned and it is probable that the conference will be held a month earlier than usual so as to avoid the intense heat of mid-summer. We also understand that the number of papers to be presented at the 1952 conference will be more severely limited, and national committees have been asked not to accept papers which are repetitive or untimely.

## *New Regulations Postponed*

THE Minister of Fuel and Power has decided to postpone, for the time being, the enforcement of Quarries, Electricity (Amendment) General Regulations, 1950, and the Metalliferous Mines (Amendment) General Regulations, 1950, details of which were announced last November and referred to in these columns in our issue of November 16. These regulations concern the use of electrical apparatus and cables installed in quarries and on the surface of mines before July, 1938. At the time of his announcement in November, the Minister also decided to revoke two exemption orders made to offset supply difficulties during the war, and these revocations have also been postponed as a result of the latest decision.

## *A Simple Display Wins*

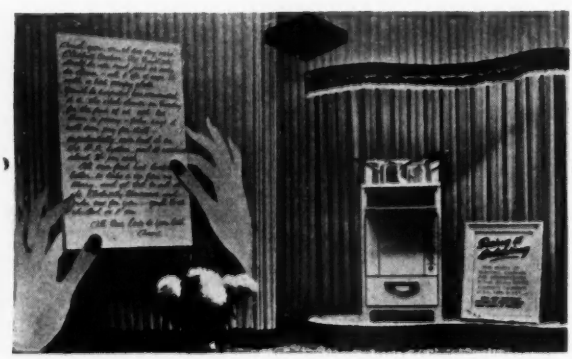
FOLLOWING our reference last week to the Eastern Electricity Board's Service Centre Display Competition, the names of winners of a similar competition held by the North-Western Board have now reached us. The chairman's challenge cup has been awarded to the Hyde (Cheshire) Centre for an admirable display which exemplifies the fact that simplicity is often a better method of presentation than a conglomeration of goods. The result was a personal triumph for Mr. John Cobham, then assistant in charge at the Centre, who is no newcomer to display honours. He gained first place in the section devoted to Electricity Boards in Hoover's spring contest, following a second prize in the same competition the previous year. Hyde is in the Board's No. 3 (Oldham) sub-area, and Mr. Cobham has since joined the commercial staff at sub-area headquarters. Other winners in the preliminary sub-area competitions were Sale and Wigan in the Manchester and Bolton districts, Fleetwood in the Preston sub-area, and Burnley, Kendal and Bramhall in the remaining districts.

## *Y.E.B. to sell Radios*

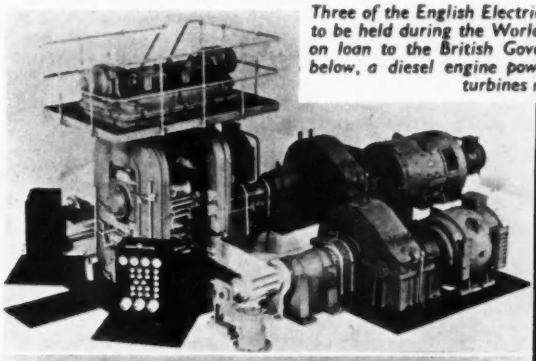
THE decision of the Yorkshire Electricity Board to enter the radio retailing field is causing some unrest among local traders who mean to protest against the move at the next meeting of their Chamber of Trade. We understand that the Board advertised, a short time ago, for a radio manager and service engineers for their No. 5 sub-area, covering Wakefield and surrounding districts, and that radio sets have been displayed in the Wakefield showroom windows. The main cause for dissension appears to be the proposed hire purchase scheme, and the chairman of W. Riding Radio and Television Retailers' Association complained that the Y.E.B. were able to offer fantastically low terms as they were already doing with other electrical appliances. It is maintained that the inclusion of radio among the authority's sales is an unfair advantage over small local traders.

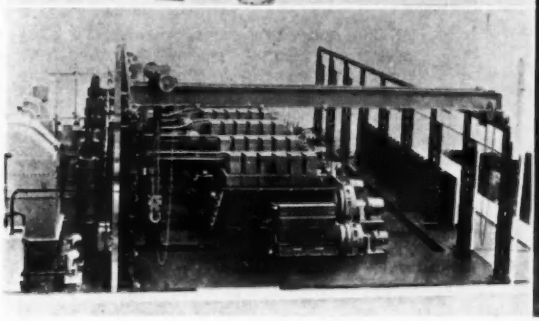
## *Engineer Explains the Shortage*

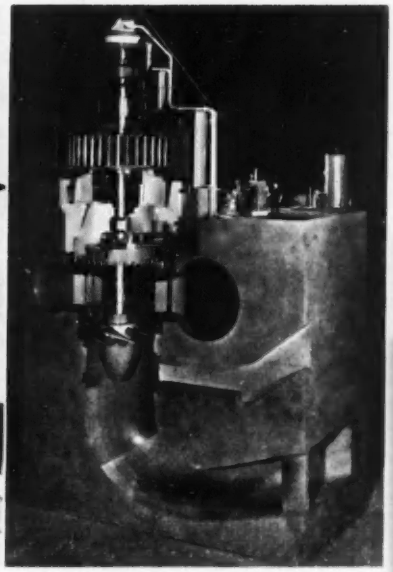
LOAD shedding was the subject of a statement by Mr. O. Howarth, N.W. Electricity Board's chief engineer, at a meeting of the Board's Consultative Council. In the course of his talk Mr. Howarth pointed out that the manufacturers of generating plant could not meet the needs of the industry at the rate the B.E.A. would like, but he added that the shortage of plant was by no means peculiar to the electrical industry. Manufacturers were, however, responding well by increasing their production. An important factor, said Mr. Howarth, was the Government's policy of exporting some of the equipment built, but that was a matter of national policy over which the industry had no control.



*Window display at the Hyde (Cheshire) showrooms which won the N.W. Electricity Board's third annual Service Centre Display competition. The simple design forms a pleasant contrast to the illustrations of winners of a similar competition reproduced last week*







*Three of the English Electric models which will be on show at the exhibition to be held during the World Power Conference in New Delhi. Left are two on loan to the British Government, above is a cold-strip rolling mill, and below, a diesel engine power station. Right is one of the two Kaplan turbines now being built for Hirakud*

Turning to the steps being taken to counteract the shortage, he explained that the B.E.A. had arranged for the greatest possible production of plant. They were at present buying steam valves from Italy, and had also arranged for an increased allocation to manufacturers of pipe work, which was becoming a bottleneck. The overhaul of equipment had been carefully planned to prevent any time being lost, and in this connection they were copying American habits studied by the Productivity Team. Turbo-generators were now running for longer periods before overhaul.

As for the Area Boards, Mr. Howarth explained that they were completely at the mercy of the consumer, but load cutting methods were continually under review. Experiments were in progress with injection equipment and it was hoped to use it as a warning to industrialists of impending cuts. Dealing with criticism about the sale of electrical appliances, Mr. Howarth said increased consumption was of national benefit, provided it was outside peak hours, as it would save fuel.

## *Models at Power Conference*

A REMARKABLE set of models of electrical machinery made by the English Electric Co. has been flown by B.O.A.C. to New Delhi, where they will be shown at the exhibition held coincidentally with the World Power Conference. English Electric has supplied a number of water power installations to India and have consequently sent some hydro-electric models, including one of a straight-flow valve being used at Castelo do Bode in Portugal, a discharge regulator, and runner wheels of both Pelton and Francis types. In addition, there is a detailed model of Kaplan turbines now being built for Hirakud on the Mahanadi River. These turbines will have an output of 52,500 h.p., the largest yet employed in India. More extraordinary is the fact that this model is motorised.

Illustrative models of equipment designed and manufactured for controlling power from hydro-electric and steam power stations will also be exhibited. In this group there is a 275 kV sub-station assembly, a 275 kV airblast circuit-breaker and a sectional model showing the internal details of a single pole of a similar breaker. In another section a model of a 3,000 h.p. 3,000 V locomotive being made for Brazil, will be included.

The same company has also loaned another two models to the British Government which has an interest in the U.K. national exhibits. These are of a diesel-electric power station and a cold-strip rolling mill.

## *Export of Power Plant*

AT a meeting of the East Midlands Consultative Council last week, members strongly criticised the Government's policy of allowing generating plant to be exported while British industry was suffering from insufficient supplies of electricity. Challenging the Government on this issue, one

member asked if it would not be better to go without cauliflowers and grapes for a time, while the shortage was being rectified. Another member claimed that several million pounds worth of plant had been sent to Russia, and since 1945 large quantities of equipment had been exported to various parts of the world. Mr. J. D. Finlay, control engineer of B.E.A., Birmingham, pointed out that while it was true that a certain amount of generating plant had gone abroad, a good deal of it was not the kind used in power stations in this country. He expressed the opinion that if demand did not increase further, the authorities would catch up in four or five years. A resolution urging an immediate inquiry to consider methods of increasing the present supply of current was adopted.

Another resolution passed at the meeting for the Board's consideration, asked that the advantages which would accrue from educational advertising be impressed upon the B.E.A. It was suggested that the right kind of publicity would explain the present shortage of generating plant and the impossibility of meeting demand for some years.

### *Factory Visits during Festival*

IN compliance with the original intention that the Festival of Britain should be a nation-wide exhibition and not confined to the South Bank site and similar restricted showgrounds, the Council of Industrial Design is inviting manufacturers to throw open their factories to overseas visitors while the Festival is in progress. Those willing to entertain Britain's guests this year are asked to send particulars to the Council, which is compiling a list and arranging for its distribution to all Industrial Information Bureaux at official exhibitions.

Many electrical firms are already aware of the beneficial results derived from "Open Days" held annually at a number of factories. Manufacturers who would like to avail themselves of this opportunity to entertain potential overseas customers, and in doing so make an important contribution to the Festival, should communicate with Mr. S. D. Cooke, C.I.D., Tilbury House, Petty France, S.W.1.

*Marconi television cameras show the passing of 1950 to those who saw the New Year in around their firesides. Last view of 1950 was Big Ben, and the first glimpse of 1951 was of the bellringers in the belfry of St. Margaret's, Westminster*

### *Grants For Science Students*

GRANTS of up to £600 a year are now available to science graduates in N. Ireland who wish to devote the whole of their time to research. They take the form of Senior Research Awards of the Department of Scientific and Industrial Research, and are for a normal period of two years. The grants are tenable at any institution in Great Britain, and in some instances abroad, approved by the Advisory Council. Details of the awards and method of application have been published by H.M.S.O. in "Notes on Grants Awarded by Department of Scientific and Industrial Research to Research Workers and Students," price 4d.

### *Copper, Lead and Zinc Prices*

THE Ministry of Supply has announced that the prices at which they will sell copper, lead and zinc to consumers in the U.K. will be those of the working day following the postage date of the order. Hitherto the operative date has been that on which the order was actually posted. This ruling came into operation on Monday last.

### *London Power Staffs Protest*

THIS is the first Christmas that members of the London Power and Northmet companies have not received their usual 7½% bonus, since under the new N.J.B. agreement this was merged, but an undertaking was given that no one would be worse off. Last week, however, a protest meeting was held of the technical and clerical staffs affected. It was pointed out that the merging of the bonus was negotiated without consultation with the staffs concerned, it was only one of several privileges that were lost under nationalisation, but it was admitted that the B.E.A. had agreed to reopen discussions on the subject. Although there was no official E.P.E.A. representation at the meeting, the technical representatives of all affected staffs were present and no dissenting voice was raised when resolutions were passed appealing to the Minister of Fuel and Lord Citrine to intervene in redressing the adverse decision on bonus payments.

*A view of the main bookshop at Cleaver-Hume Press Ltd.'s Oxford Street headquarters, showing the decorative ceiling feature and the double line of three-tube fittings*

## *Bookshop Lighting*

NEW lighting fittings involving cold cathode tubes have been installed by the G.E.C. at the London headquarters of Cleaver-Hume Press Ltd. The interior of the firm's new bookshop is lighted by 16 cold cathode fittings of a recent design in which the gear cases have rounded contours to blend effectively with the architectural features of the ceiling. Part of the installation is the result of some extensive tests to discover the most satisfactory type of light for showing book jackets to the best advantage, and the result is a colour combination of two natural tubes and one gold.

The new shop forms an attractive addition to the window displays in Oxford Street, and the G.E.C. were also responsible for the installation of window lighting. This involves natural colour fluorescent lamps in angle-type, twin-lamp shop window fittings with louvres, concealed behind pelmets or frosted glass panels.

## *Swann Diploma*

NOW in its sixth year of operation, the A.S.E.E. Swann Diploma scheme has established itself as a valuable contribution to the electrical industry by providing a standard of qualification for supervising electrical engineers.

The scheme has been revised this year as a result of experience over the period of its operation, and on the advice of the examiners and the Diploma Committee, there will, in future, be separate examinations and diplomas for electrical installation practice and electrical maintenance respectively, but no combined examination and diploma for both examinations together, as was previously the case. Where a candidate shows a high standard of knowledge in technical ability or administration and organisation, he may be awarded credits, and where exceptional ability overall is shown he may be awarded honours.

Full details of the scheme can be obtained from the General Secretary, A.S.E.E., 54 Station Road, New Barnet, Herts.

## *Underground Gasification*

RECENT developments in the utilisation of coal in narrow seams by underground gasification were mentioned by Dr. H. Roxbee Cox, chief scientist to the Ministry of Fuel and Power, at a luncheon of the Coal Industry Society on Monday. Two methods, he said, were in use. One involved creating a U-shaped channel in the seam and connecting this to the surface by two vertical shafts. The other consisted of driving two vertical shafts into the seam and connecting them by pneumatic pressure.

The first method has been used in a system started on July 13, which was still operating and the second had been working for just over a month. The gas obtained had a calorific value of about 75 B.Th.U./cu. ft., and could be usefully burned in a gas turbine. It had also been found possible to burn a 1% mixture of air and methane and work was proceeding to use the methane and firedamp found in the ventilating air in upcast shafts. It was expected to get a gas turbine working at a pit about the middle of 1952.

Dr. Roxbee Cox also referred to the "heat-pump" which had been built by the Ministry of Fuel and Power scientists for the heating and cooling of the Royal Festival Hall.

## *NEWS IN BRIEF*

The annual meeting of the B.E.D.A. is to be held at the Connaught Rooms (London) on April 13. The meeting will, as usual, follow members' annual luncheon.

The Electrical Trades Commercial Travellers' Association is holding its general meeting tomorrow (Friday) at the Feathers' Hotel, Broadway, S.W.1. We also note that the Association's annual luncheon has been fixed for February 16 at the Connaught Rooms.

A course of six evening lectures on "Liquid Fuels" is to open at the Northampton Polytechnic, St. John Street, E.C.1, on February 6. Lectures will be given each Tuesday by Mr. G. F. J. Murray. Fee is 20s.

Douglas (I.o.M.) Corporation Electricity Department are staging an attractive exhibition at the Villa Marina this week, showing displays of all types of fittings, appliances and equipment. Demonstrations of cooking, baking, water heating and laundry equipment are included in the exhibition's programme together with a free film show each evening. The exhibition closes on Saturday.

# *Electric Supply News*

**Aberavon**

There are reports in Port Talbot of a proposal to erect a new power station at Aberavon on a site within the docks perimeter. It is stated that meetings have taken place between representatives of the B.E.A. and the local council on the question of possible sites.

**Edinburgh**

Following discussion at last Thursday's meeting of the city council of the report on the recent conference in London between representations of the city and the B.E.A. on the question of power cuts and voltage reductions in Southern Scotland, the council has decided to hold a special meeting on January 22. In his statement, the Lord Provost, Sir Andrew Murray, alleged that there was no co-ordination for Scotland in the provision of electricity, that the South Scotland area had fallen between two stools—the B.E.A. and the North of Scotland Hydro-Electric Board—and that the present divided organisation of electricity supply in Scotland was having adverse effects at the conference. He insisted that nothing had been done since the vesting day by way of the provision of plant in the South of Scotland area, whereas in England practically 1,000,000 kW of plant had been added last year. It was also regretted that the new 60 MW set was not yet operating at Portobello. In the course of a long reply, Sir John Hacking, deputy chairman, operation, B.E.A., explained how transmission limitations between north and south did not permit exporting from the south to the extent of making load-shedding exactly equal throughout the country, and that action was being taken to rectify this situation.

The North of Scotland Hydro-Electric Board, in a letter, intimated that they had supplied approximately 150 MW on many days in December, thereby living up to their promise of more than two years ago. If the same progress had been made on steam stations as on hydro stations, they added, about 140,000 kW of the new steam capacity would have been in commission and the total capacity available would have been sufficient to meet all requirements of southern Scotland. Having regard to the problems involved in constructing hydro stations in isolated sites where special camps (which take at least a year to complete) have to be provided to house the workers, it would be reasonable to have expected even better progress on the steam extensions, the Board concluded.

**Eire**

Because of the growing demand for electricity in Galway, the Electricity Supply Board has decided to construct a third 110 kV power line from Ardnacrusha to Galway.

**Glasgow**

In the wordy debate on the Scottish power question, which has been going on for some time now, the Lord Provost of Glasgow, Mr. V. Warren, has addressed more questions to Mr. J. S. Pickles, chairman of the South West Scotland Electricity Board. They are (1) When is the Board likely to be self-supporting in capacity? (2) How much plant is required in the immediate future in order to bring that about? and (3) What is the amount of capital expenditure involved?

**Lambeth**

Plans to install all-electric equipment, to the exclusion of gas, at three new housing estates in Lambeth have aroused feeling among members of the Borough Council, and now the Housing Committee is to re-examine the whole question. Some councillors felt it would be unfair to both the Government and the housewives to give electricity preference over gas. The three estates earmarked to be all-electric are at Studley Road, South Lambeth, one of the borough's biggest post-war schemes, Solon New Road, Brixton, and at Leigham Court Road.

**Malvern**

Following the private conference last Thursday on the scheme for erecting a 66 kV overhead line across Malvern Hills, Ald. W. S. Lewis, Chairman of the Midlands Electricity Board, stated that if an underground line was laid many Herefordshire farmers would be deprived of a supply, for the cost of such a line would be £35,000 against £8,600 for the overhead line. Ald. Lewis said he thought that only about two pylons would be visible from the hills.

**North-Western**

The North-Western Electricity Board has fulfilled its promise to the isolated villages of Rathmell and Wigglesworth, near Settle. A ten mile tributary line has been laid to the villages.

**Polruan**

Future visitors to Polruan, the picturesque little Cornish village with its steep ascent from the river Fowey, will note a recent improvement to the local electricity supply. Difficulties with the old d.c. supply given by the former non-statutory undertaking, led inhabitants to make representations, through the South Western Electricity Consultative Council, to be provided with a supply by the South Western Electricity Board. An agreement to this end was negotiated by the Board and the owners of the Polruan undertaking. The change-over, which was carried out within a week, was effected smoothly. Altogether 334 consumers have been connected, and at the change-over there was an immediate four-fold increase in the number of cookers installed. A new street lighting system, on which there has been much favourable comment, has been put into operation by the Board.

**Poole**

The first 50 MW turbo-alternator was given its tests a few days ago.

**Southampton**

The Harbour Board has approved, in principle, the B.E.A.'s proposal to erect a new power station at Marchwood. The location of the coal-

ing pier would be conditional upon the decision of the Transport Commission regarding the construction of an additional jetty parallel to the New Docks quay wall.

## LIGHTING SCHEMES

**Bingley.**—It is proposed to invite tenders for the extension of main road lighting from Cross Flatts to Keighley boundary. A scheme is also to be prepared for electric lighting in Park Road.

**Chesterfield.**—Proceeding with scheme for converting street lighting to electricity.

**Coventry.**—The T.C. is to establish its own Street Lighting Section of the City Engineers' Department.

**Doncaster.**—T.C. to borrow £6,392 for improved street lighting on part of Great North Road.

**Falkirk.**—The lighting superintendent is to submit a report on the state of street lighting in the town.

**Felixstowe.**—The U.D.C. has set aside £1,000 in the 1951-52 estimate to provide decorative lighting along the sea-front.

**Nairn.**—The C.C. at its quarterly meeting decided to remit the question of lighting in Auldearn back to the Road's Committee for their further consideration. The scheme called for fourteen standards.

**Peterborough.**—City engineering preparing a scheme for improving street lighting on all through roads and bus routes.

**Slough.**—Because of the cost—about £3,565—and the urgency of other works, the corporation Highways Committee has postponed plans for improved street lighting in Uxbridge-road. But the borough engineer is to see if it is possible to light up the service road in Uxbridge-road on the east side of Upton Lea estate. Other lighting schemes include one costing £2,100 for improvements in Stoke Poges Lane for which consent is awaited.

**Sowerby Bridge.**—The Finance Committee has recommended that £4,830 which has been received from the Gas Council, as payment of severance compensation, should be used to finance the installation of fluorescent light from the Nook to Halifax borough boundary.

**Swadlincote.**—The U.D.C. has received authorisation from the M.O.T. to carry out the second stage of the street lighting scheme.

# *Company Activities*

### Enfield Cables Ltd.

Preliminary arrangements are being made for the issue of £1,500,000 of debentures. A meeting of the holders of the 7½% Preference stock, has been called to secure their consent to the borrowing. This sanction will enable the directors to proceed with the issue at their discretion when a favourable opportunity occurs.

### Radio Rentals Ltd.

There is a final Ordinary dividend of 20%, against 15%, making a total of 30%, compared with 25% last year. The Preliminary statement records a net profit for the year to August 31 of £153,256, as compared with £138,654 in the previous twelve months; after charging all expenses, depreciation of sets and taxation. The Board is offering another 100,000 Ordinary shares to holders, at 10s. each, in the ratio of one new for every seven held.

### Tube Investments

The directors have announced that the offer to shareholders of 5,000,000 4½% Cumulative Redeemable Preference shares of £1 each at par, was heavily over-subscribed. Applications for up to 750 shares will be allotted in full.

### Dividends Declared

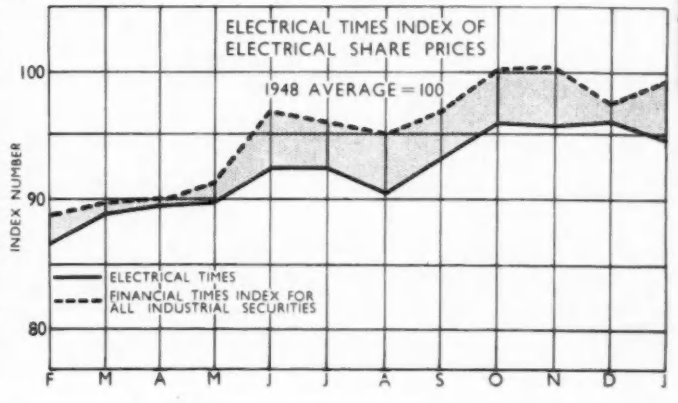
*Greenwood and Batley.* Interim of 5% (*same*).

*Hackbridge Cable Holdings.* Interim of 7½% (*same*).

*Murex Ltd.* Interim Ordinary dividend of 5% (4%), payable on January 31.

*Worthington and Simpson.* Dividend of 10% (*same*), payable on January 31, on capital increased by 50% bonus.

*Electrical share prices fell slightly as a result of the month's operations, the "Electrical Times" index figure dropping 1·2 points to be come 94·5. In the same period the "Financial Times" index for all industrial ordinary shares showed a rise to 99·1 both figures being based on the average value of prices during 1948. At the beginning of the year the "Electrical Times" index stood at 88·7.*


ELECTRICAL TIMES INDEX OF ELECTRICAL SHARE PRICES
1948 AVERAGE = 100
INDEX NUMBER
100
90
80
ELECTRICAL TIMES
FINANCIAL TIMES INDEX FOR ALL INDUSTRIAL SECURITIES
F M A M J J A S O N D J

# Commercial Information

## CONTRACTS OPEN

### HOME

**Jan. 12.—Pudsey.** The supply of 20 cwt. electric trucks included among items of plants. Borough Surveyor, Town Hall.

**Jan. 13.—Crail T.C.** Electrical work in erection of 22 houses in Kirkmay Rd. Architect is J. C. Cunningham, Alexandra Place, St. Andrews.

**Jan. 13.—Durham.** Electrical installations in 20 schools. Form(s) of tender from County Architect's Office, Court Lane, Durham.

**Jan. 13.—Felling U.D.C.** Supply of 76 2-kW electric fires for houses on Ellen Wilkinson estate, Wardley. Tenders to T. Myrddin Baker, Clerk of the Council, Council Buildings, Felling, Gateshead 10.

**Jan. 13.—Sutton and Cheam.** Supply and erection of automatic electric sewage pumping plant, comprising three vertical spindle centrifugal pumps, motors, starter panels, etc. N. H. Mitchell, Borough Engineer and Surveyor, Municipal Offices, High St., Sutton. Deposit £2 2s.

**Jan. 15.—Cork.** Electrical installation in additional classrooms at school at McCurtain St. B. O'Flynn and Son, 60 South Mall, Cork. Deposit £20.

**Jan. 15.—Fife.** Electrical installation in a block of 18 flats at Kennoway. Surveyors, Wilkinson and Lowe, 2a Chalmers St., Dunfermline.

**Jan. 15.—Newmarket U.D.C.** Supply and erection of two vertical spindle centrifugal pumps driven by electric motors; also for booster pump drive by electric motor and automatically controlled. Consulting Engineers, Silcock and Simpson, 10 Park Row, Leeds. Deposit £5.

**Jan. 15.—Stepney.** Installation of fluorescent lighting at Whitechapel Public Library; rearrangement of main supply at intake, and alterations to some existing circuits. A. A. Hudson, Borough Engineer and Surveyor, Municipal Offices, Duval St., E.1.

**Jan. 15. — Wrexham R.D.C.** Wiring for electric light and power in 26 houses at Llay, 24 at Ruabon, 22 at Rhos, and 18 at Rhostyllen. E. D. Edwards is engineer and surveyor, Imperial Buildings, Regent St., Wrexham. Deposit £2 2s.

**Jan. 16.—Kearsley U.D.C.** Supply and erection of street lighting columns and installation only of lanterns, control gear and wiring. Also supply of lanterns and auxiliary equipment. Engineer and surveyor, E. C. Kirk. Deposit £2.

**Jan. 17.—Birkenhead.** Electric lamps are included in the Ferries Dept.'s list of annual supplies for period up to March 31, 1952. Documents from General Manager, Corporation Ferries, Woodside Ferry, Birkenhead.

**Jan. 17.—Morecambe and Heysham T.C.** Electrical installation to 26 houses on Blackberry Hall estate. Borough Surveyor, Town Hall, Morecambe. Deposit £1.

**Jan. 18.—Huntingdon.** Wiring for electricity of following houses: 1-10 Stow Rd., Spaldwick; 1-2 Easton Rd., Easton; 1-4 Church Lane, Brington; 1-2 Thrapston Rd., and 1-4 Grafham Rd., Ellington. Surveyor, Montagu House, Huntingdon.

**Jan. 18.—Poplar.** Supply of electric lamps for year beginning April 1. Town Clerk, Poplar Town Hall, Bow Rd., E.3.

**Jan. 19.—Beckenham (Kent).** Jobbing work in electrical trades included in list of works for period beginning April 1, 1951. Borough Engineer, Town Hall.

**Jan. 20.—Bootle.** Supply of electric cables and flexes and electric lamps during year ending March 31, 1952. Borough Surveyor, Town Hall.

**Jan. 20.—Exeter.** Rewiring of Redhills Hospital, St. Thomas, for E. Devon Hospital Management Committee. F. J. Davis, group engineer, Royal Devon and Exeter Hospital, Exeter. Deposit £2 2s.

**Jan. 20.—Sunderland T.C.** Electrical installation in Thorney Close secondary modern schools. Architects, S. W. Milburn and Partners, 9 The Esplanade, Sunderland. Deposit £2 2s.

**Jan. 22.—Musselburgh.** Electrical work in erection of 6 houses in Mansfield Rd. Burgh Surveyor, Municipal Offices, High St.

**Jan. 25.—Galway.** Installation of refrigerating equipment for New Regional General Hospital, comprising two compartment cold room, capacity 385 cu ft, including compressors, and 15 cabinet refrigerators from 40 to 7·7 cu ft. Consulting Engineers, J. A. Kenny and Partners, 44 Kildare St., Dublin C.17.

**Jan. 29.—West Riding.** Renewal of electrical installation at Rothwell grammar school. County Architect, "Bishopgarth," Westfield Rd., Wakefield. Deposit £1 1s.

**Jan. 30.—Belfast.** Supply and erection of trolleybus overhead line equipment. Documents from Transport Dept., Sandy Row, Belfast.

**Feb. 1.—Birmingham.** Renewal of electric lighting and power installation at King's Heath police station. H. J. Manzoni, city engineer and surveyor, Civic Centre, Birmingham 1. Deposit £2 2s.

**Feb. 2. — Belfast.** Electricity Dept. invite supplies of various equipment and appliances including transformer kiosks, meters, l.t. fuse units, underground cable disconnecting boxes, washboilers, kettles and cooker boiling plates. Documents from the Dept., East Bridge St., Belfast. (Advertised in this issue.)

**Feb. 2.—Belfast.** Supply and erection of $CO_2$ fire fighting equipment for protection of 33 kV switchgear. Merz and McLellan, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See Jan. 4 issue.)

**Feb. 2.—Tottenham.** Council require supply of electric lamps. Tenders to M. Lindsay Taylor, Town Clerk, Town Hall, N.15.

**Feb. 3.—Colwyn Bay.** Supply and erection of two electric centrifugal booster pumps. Borough Engineer, Town Hall.

**Feb. 3.—Swansea.** Electric lamps for public lighting are contained in list of annual supplies for period beginning April 1. Borough Engineer and Surveyor, The Guildhall.

**Feb. 10.—Biggleswade U.D.C.** Supply and erection of 43 concrete columns, lanterns, 140 W sodium discharge lamps, auxiliary equipment and wiring on trunk road. T. Wilson, Engineer and Surveyor, Church St. Deposit £2 2s. (Advertised in this issue.)

**No date stated. — Newcastle-upon-Tyne T.C.** Electric lighting installation in a total of 770 existing Council houses, in groups of approximately 100. Applications to city architect, 18 Cloth Market, Newcastle-upon-Tyne 1.

**No date stated.—Morpeth T.C.** Tenders being obtained for installation of electricity in 175 houses at present supplied with gas. Borough Engineer, F. K. Perkins, Bridge St., Morpeth.

**No date stated.—Wigton (Cumb.) R.D.C.** Electric wiring of 24 council houses at Silloth. Surveyor, Council Offices, George St., Wigton.

**No date stated.—Glenrothes.** Electrical installation in 6 shops and 10 houses at Woodside. Apply to Secretary, Glenrothes Development Corp., Woodside, Glenrothes, nr. Markinch, Fife.

**No date stated.—Houghton-le-Spring (Durham) U.D.C.** Tenders being obtained for electrical equipment for proposed conversion of Houghton Rectory into council offices. Surveyor is W. H. Smith, Newbottle St.

**No date stated.—Leslie.** Electrical work in alterations and additions to 16 houses at Mansfield. Applications to A. D. Waxton and Watson, Architect, Leven.

**No date stated.—Nottinghamshire.** Supply of electrical and wireless goods for C.C. Supplies Officer, Shire Hall, Nottingham.

**No date stated.—Castle Ward R.D.C.** Electrical installation in 26 houses at Stamfordham. G. E. Dimmack, surveyor, North Rd., Ponteland.

## OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

**Jan. 24.—Wellington (N.Z.).** Harbour Board invite tenders for electrical equipment including switchgear and both inside and outside lighting fittings. B.o.T. (Ref. CRE (IB) 74291/50).*

**Jan. 29.—Egypt.** Ministry of Municipal and Rural Affairs requires diesel electric generating sets for enlargement of power stations at Fakous, Simbellawein, Fashu, Abu Tig and Kafr el Sheikh. B.o.T. (Ref. CRE (IB) 58301/50).*

**Jan. 29.—New York.** United Nations invite tenders for automatic private telephone exchange system for intercommunication between various locations at U.N. headquarters.

**Jan. 30.—Wellington (N.Z.).** New Zealand Post Office invites tenders for supply of various types of switchboard cable. B.o.T. (Ref.: CRE (IB) 74055/50)*

**Feb. 9.—Brisbane.** Tenders invited for one high voltage Schering Bridge. Specifications must be purchased from the Manager, Dept. of Electricity, Kelvin House, Adelaide St., Brisbane, at cost of 10s. 6d. per copy.

**Feb. 13.—Pakistan.** Tenders invited for wireless sets, No. 22, kit No. 3. Documents available from Commercial Secretary, Supply and Stores Dept., 40 Lowndes Sq., S.W.1. Deposit 5s. (Advertised in this issue.)

**Feb. 23.—Invercargill (N.Z.).** Six 100 kVA and six 50 kVA distribution transformers for Corporation Store, Leven St., Invercargill. B.o.T. (Ref. CRE (IB) 50037/51).*

**Feb. 27.—Johannesburg.** Supply and erection of six 6 kV 400 V switchgear for lime burning and water treatment plant at Zuiker-Bosch pumping station. Documents from Chief Engineer, Rand Water Board, 3 Fraser St. P.O. Box 1127, Johannesburg. Deposit £3.

**Mar. 1.—New York.** United Nations require television and camera transmission equipment. B.o.T. (Ref. CRE (IB) 72118/50).*

## CONTRACTS PLACED

**B.E.A.** Main transformers and accessories, Tilbury Power Station, English Electric Co., Ltd.; two 30 MW turbo-alternator sets for Connah's Quay Power Station, C. A. Parsons and Co., Ltd.; Works power switchgear, Rye House Power Station, British Thomson-Houston Co., Ltd.; three 60 MW turbo-alternator sets, Keadby Power Station, Leeds; and two 60 MW turbo-alternator sets, Skelton Grange Power Station, C. A. Parsons and Co., Ltd.; two 30 MVA 132/33 kV transformers and earthing transformers, Carmarthen and Haverfordwest substation, Hackbridge and Hewittic Electric Co., Ltd.; two 60 MW 132/33 kV transformers and earthing transformers, Telford Road and Gorgie substations, Metropolitan - Vickers Electrical Co., Ltd.

**Bournemouth T.C.** Supply and installation of electrical switchgear at Pavilion Theatre, Strand Electric Co., £4,126.

**Hull T.C.** Electrical installation at Shell House, Ferensway. J. Todd, £3,314.

**Newcastle-on-Tyne.** Electrical installation at Ravenswood Rd. county primary school. R. V. Hogg & Co., £5,495.

## *Your Queries — Answered*

**"Sylphon" refrigerator thermostat,** makers of? B.C. —Crosby Valve and Eng. Co. Ltd., Ealing Road, Alperton, Wembley. (19278)

**"Ennavel" heater/cooker,** makers of? W.P.—We presume this reader refers to "Emmarel" a product of Emmarel Distributors Ltd. whose last noted address is 22 High St., Kingston. (19283)

**Meters which also act as rent collectors,** makers of? J.E.—Chamberlain and Hookham Ltd., Magnet House, Kingsway, W.C.2; Metropolitan-Vickers Electrical Co. Ltd., 132 Long Acre, W.C.2; Venner Time Switches Ltd., Beverley Way, New Malden; Sangamo Weston Ltd., Gt. Cambridge Rd., Enfield. (19286)

**"Zedlok" steel trunking,** makers of? E.B.—Mantel Metalworkers Ltd., 50 Stuart Rd., London S.E.15. (19289)

*The above are selected from questions we have answered this week. If you have a query, send it to us.*

**ANSWER WANTED**

**"Astralect" heated towel racks,** makers of? T.E. (19297)

## NEW COMPANIES

*Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.*

**Ambrose and Albrow Ltd.,** 51 High St., Sittingbourne, Kent. Electricians, electrical engineers and agents for and dealers in radio, television and electrical apparatus, etc. Cap.: £2,000. Dirs.: I. M. A. Matheson, E. W. A. Ambrose and R. B. Albrow.

**Barrywald Manufacturing Co., Ltd.,** 1 Leadenhall St., E.C.3. Manufacture, maintenance or supply of incinerators or other plant and equipment for or to Barrywald Products Ltd., etc., and manufacturers of and dealers in electrical, chemical and sanitary equipment, etc. Cap.: £5,000. Dirs.: M. Coles Harman, B. B. Garle, P. H. H. Jones and S. Lewis.

**Blagbrough and Hebblethwaite Ltd.,** Bank Top Works, Bank Top, Southowram, Halifax. To take over business of electricians, electrical contractors, wireless and television engineers carried on as "Blagbrough and Hebblethwaite" at Southowram, Halifax. Cap.: £5,000. Dirs.: H. Blagbrough and A. W. Hebblethwaite.

**Conductair (London) Ltd.,** Abford House, Wilton Rd., S.W.1. To carry on business of mechanical, electrical and general engineers, etc. Cap.: £100. Dirs.: F. Devine, Joan Devine and J. W. Martin.

**Greenhalgh and Duxbury Ltd.,** 3 Stanley Court, off The Rock, Bury. To take over the electrical engineering business of Stanley Greenhalgh carried on by him at Stanley Court, off The Rock, Bury. Cap.: £10,000. Dirs.: S. Greenhalgh and A. Duxbury.

**Hazeltons Ltd.,** 92 Kings Av., Holland-on-Sea, Essex. To take over business of a dealer in electrical goods carried on as "F. W. Hazelton" at Holland-on-Sea, Clacton-on-Sea and Frinton-on-Sea. Cap.: £10,000. Dirs.: F. W. Hazelton, F. W. Hyde, R. F. Howard and G. M. Hazelton.

**Michael Dix Ltd.,** 23 Manor Park Rd., E. Finchley, N.2. Lighting consultants and manufacturers of and dealers in electrical appliances of all kinds, etc. Cap.: £100. Dirs.: M. Dix and Mrs. I. C. L. Dix.

### PRICES OF CABLE METALS AND OTHER MATERIALS
*(at Tuesday night)*

| | | New York price |
|---|---|---|
| COPPER, electrolytic | 202 0 0 | £196 0 0 |
| Delivered in 2nd and 3rd month after order | 215 10 0 | — |
| Delivered in 4th, 5th and 6th month after order | 217 0 0 | — |
| LEAD, good soft pig (foreign) | 136 0 0 | 136 0 0 |
| " " " "English" quality | 137 10 0 | |
| Delivered in 2nd and 3rd month after order, plus | 7 0 0 | |
| TIN (99-99.75%) (Cash) | 1205-1215 | — |
| " (3 months) | 1200-1210 | — |
| ALUMINIUM, commercial purity (del.) | 124 0 0 | — |
| ZINC | 151 0 0 | 140 0 0 |
| ARMOURING: | | |
| Galv. Steel Wire (0.104 in.) | 45 10 0 | — |
| Mild Steel Tape (0.04 in.) | 26 0 0 | — |

## GAZETTE ANNOUNCEMENTS

### COMPANIES ACTS

**Charlton Electrical Appliances Ltd.** Meetings of creditors and members will be held at A. C. Palmer and Co., Court Chambers, Friar Lane, Leicester, on Feb. 5, at 11 and 11.30 a.m.

**Gourlay Electrical Ltd.** Meetings of members and creditors to be held on Jan. 30 at 41 North John St., Liverpool 2, at 11.30 a.m. and 12 noon respectively, to receive liquidator's report.

**H. Lawrence Electrical Ltd.** Meetings of creditors and members to be held at St. Stephens Chambers, Telegraph St., Moorgate, E.C.2, on Jan. 12 at 12 noon and 12.30 p.m. respectively.

**Sparks, Brown and Co. Ltd.** Meeting of members will be held at 83 Bellenden Rd., Peckham, S.E.15, on Feb. 5 at 3 p.m. to receive liquidator's report.

*Partnership dissolved*

**Leeds.** Harold Feldman and Sam Flick, trading as manufacturers' merchants and agents at Winnie Terr., Whitehall Rd., and 19, 21, 23 Newcastle Pl., Bramley, Leeds. Partnership dissolved as from Sept. 22. All debts paid by H. Feldman, who will continue the business.

*Release of Liquidator*

**London.** Davidson and Scott Ltd., electrical and general engineers, of 5 Victoria St., S.W.1. Liquidator: John P. Landan, 52-54 High Holborn, W.C.1. Date of release, Oct. 4.

*Appointment of Liquidators*

**London.** D.B.H. (Engineers) Ltd., electrical heating and domestic engineers, Grosvenor Sq., W.1. Liquidator is N. W. Osborne, 11-12 Finsbury Sq., E.C.2, with committee of inspection.

**London.** M. Allen (Radio) Ltd., 113 Charing Cross Rd., W.C.2. John S. Bradley-Hole, 240 High Holborn, W.C.1, has been appointed liquidator with committee of inspection.

**London.** Medcalfe and Co. Ltd., mechanical and electrical engineers of 141 and 142 Saffron Hill, E.C.1. James William Clement, 59 New Cavendish St., W.1, appointed liquidator with a committee of inspection.

### BANKRUPTCY ACTS

*First Meetings*

**Aylesbury.** Leonard George Sharp, electrician of 4 Summerley's Rd., Princes Risborough, Bucks. Meeting at 3 Central Buildings, Matthew Parker St., S.W.1, on Jan. 19 at 12 noon. Public examination at County Hall, Aylesbury on Feb. 22 at 2.30 p.m.

**Shrewsbury.** James Shelvey, electrical engineer trading as "Vesta-Shelvey Electric Installations" at Vesta Manufacturing Works, Oakengates. Meeting at Official Receiver's Office, 12 Lonsdale St., Stoke, on Jan. 13 at 11.45 a.m. Public examination at Shire Hall, Shrewsbury, on Feb. 13 at 3 p.m.

## TRADE NOTES

**Change of Address.**—The Industrial Department of Philips Electrical Ltd., which was previously operated from 122 Snow Hill, Birmingham, is now accommodated in the main branch premises at 28a and c Ludgate Hill, Birmingham.

**Agents.**—Linolite Ltd. have appointed the following agents in Northern Ireland and Eire, respectively:—W. Reay, of J. J. Hyde Ltd., 38 Bedford St., Belfast. Tel.: 21739; C. Nolan, Charles Nolan and Co., 2 Parker Hill, Rathmines Rd., Dublin. Tel.: 93510.

# BUSINESS PROSPECTS

**Ashby-de-la-Zouch U.D.C.** It is proposed to build 24 houses at Moira Road.

**Aylesbury T.C.** Proposals for erection of 82 houses have been submitted for approval.

**Aylesham (Kent).** Approval received for erection of infants' school at estimated cost of £37,000.

**Bassingbourn (Herts.).** Scheme approved for construction of a secondary modern school. Estimated cost of £86,940.

**Belfast.** Construction of 24 dwellings at Sunningdale Park for N. Ireland Housing Trust. Offices at 12 Hope St., Belfast.

**Bentley (Yorks.) U.D.C.** Construction of 18 bungalows and one communal building. Engineer to Council, R. N. Penlington, Council Offices, Bentley, Nr. Doncaster.

**Birmingham.** Erection of airport terminal building in city centre. H. J. Manzoni, City Engineer and Surveyor, Civic Centre, Birmingham 1.

**Bootle.** Erection of block of 12 flats near Ford Station. Borough Surveyor, Town Hall.

**Brierfield U.D.C.** Construction of a block of flats. Office of Surveyor, Town Hall.

**Burnley.** Erection of Ivy Bank high school. Borough Engineer and Surveyor, 22-24 Nicholas St., Burnley.

**Clackmannan.** C.C. to erect secondary school at Parkhead estimated to cost £191,500.

**Cromer.** E. Anglian Regional Hospital Board recommended to appoint E. Boardman and Son, Queen St., Norwich, as architects for proposed installation of light at Fletcher Convalescent Home.

**Croydon T.C.** Tenders to be invited for construction of New Addington (East) primary school at estimated cost of £110,220.

**Devon.** County primary school to be built this year at Barnstaple.

**Dudley T.C.** Erection of extensions to Dudley and Staffs. Technical College. A. C. H. Stillman, Architect and Surveyor, Green Hall, Lichfield Rd., Stafford.

**Flintshire.** Erection of Horticultural College at Celyn, Northop, for Co. E.C. W. Griffiths, deputy County Architect, Llwynegrin, Mold.

**Glamorgan.** Additions to Mining and Technical Institute at Pontardawe. County Architect, L. R. Gower, Glamorgan County Hall, Cardiff.

**Glasgow.** Layout plans approved for erection of 2,311 dwellings at Barlanark.

**Gosforth U.D.C.** It is proposed to erect 96 houses in Church Av. and Church Rd. Clifford Wyld is Council's Surveyor.

**Grangemouth (Stirling) T.C.** Plans have been submitted for erection of 84 houses at Beancross.

**Leeds.** Regional Hospital Board has approved erection of a sanatorium for Bradford-Halifax-Huddersfield area.

**Liverpool.** Construction of Speke and Walton Lane county primary schools. City Architect and Director of Housing, Blackburn Chambers, Dale Street, Kingsway, Liverpool 2.

**Lowestoft.** E. Anglian Regional Hospital Board to invite tenders for conversion of internal electrical installation at Lowestoft and N. Suffolk Hospital. Estimated cost £3,300.

**Maidstone R.D.C.** Construction of 42 houses on sites at Coxheath, Staplehurst and Bearsted. Engineer and Surveyor, Council Offices.

**Manchester.** It is proposed to replace gas lighting in the gas showrooms at Town Hall extension with electricity. Estimated cost is £1,795.

**Middlesbrough.** Tenders expected to be invited for installation of automatic emergency lighting at Central Baths. Cost will be about £580.

**Newmarket U.D.C.** Erection of 16 houses. H. G. Kenyon, Chartered Architect, Council Offices, Severals House, Newmarket.

**Northampton R.D.C.** Erection of 64 houses on six sites. R. J. Miller, Architect, 1 Cheyne Walk, Northampton.

**North Riding.** Erection of grammar and modern school at Easingwold. F. Barraclough, Secretary, Education Offices, County Hall, Northallerton.

**Poole T.C.** Erection of 234 houses on Waterloo estate. Borough Engineer, Municipal Buildings.

**Preston.** Erection of junior section of Ribbleton Hall county primary school. Borough Engineer and Surveyor, Municipal Building, Preston.

**Scarborough T.C.** Erection of 36 houses at Eastfield. H. V. Overfield, borough and water engineer, Town Hall.

**South Shields T.C.** A £21,048 scheme for erection of block of shops on Lizard Lane estate has been submitted for approval. Also the erection of children's home at Simonside. John Reid, Borough Engineer, Town Hall.

**Standish (Lancs.) U.D.C.** Erection of 20 houses on Grove Lane estate. E. J. Brooks, engineer and surveyor, Ashfield House, Standish, Nr. Wigan.

**Swansea.** Erection of primary school at West Penlan. H. T. Wykes, Borough Architect, The Guildhall. Also, the Medical Research Council proposes to build a research laboratory in the town.

**Tipton.** Erection of 30 houses on Upper Church Lane estate. Housing Architect, Municipal Buildings.

**Wallsend.** Installation of electric lighting in schools at present served by gas, is included in estimates.

**Wellingborough U.D.C.** Erection of 76 houses on Croyland Hall Farm estate. R. Kilby, Engineer and Surveyor, Council Offices.

**West Riding.** Extensions to Ecclesfield secondary grammar school; adaptations for science laboratory at Woodhouse grammar school; and erection of Rothwell, Methley, Micklefield proposed primary school. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

**Worcester.** Erection of infants' dept., Honkswood county primary school. Director of Education, 4 Copenhagen St., Worcester.

## OVERSEAS

**Canada.** C. E. Springer and Co., Ltd., 37 McCaul St., Toronto, Ontario, are anxious to represent U.K. manufacturers of small electrical appliances in the Province of Ontario. Mr. C. E. Springer will be visiting this country in February, staying at Regent Palace Hotel from Feb. 7 to 21.

# MEETINGS TO NOTE

## THURSDAY, JAN. 11

DUNFERMLINE ELECT. SOC.—"Overhead Transmission." A. Erskine, Unitas Hall, Queen Anne St., 7 p.m.

I.E.S. (Leicester Centre).—"Acrylic Plastics in Lighting." P. H. Collins. E. Midlands Elect. Board, Charles St., 6.30 p.m.

INSTN. OF WORKS MANAGERS (Wembley sub-branch).—"Production Control in a Light Engineering Factory. A. E. Barritt of Kodak, Ltd. "The Plough," Kenton Rd., Kenton, 12.30 p.m.

I.E.S. (Glasgow Centre).—"Lighting in the Home." Miss M. D. Wardlaw. 39 Elmbank Crescent, Glasgow C.2, 6 p.m.

I.E.S. (Manchester Centre).—"The Contractor Sheds Some Light." F. Ainscow. Manchester Town Hall, Extension 1, 6 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section). — "Frequency Modulation and F.M. Measuring Equipment." E. D. Hart and A. G. Wray. Instn. of Engrs. and Shipbuilders, Glasgow, 6.45 p.m.

INCORP. PLANT ENGRS. (E. Lancs. Branch).—"Electricity in Cotton." R. W. Cox. Engrs. Club, Albert Sq., Manchester, 7.15 p.m.

I.E.E. (London).—"Development and Design of High Voltage Impulse Generators." F. S. Edwards, F. R. Perry and A. S. Husbands. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N.E. Scotland Sub-centre).—"Some Electrical Methods of Measuring Mechanical Quantities." Royal Hotel, Union St., Dundee, 7 p.m.

I.E.E. (W. Wales Sub-centre).—Report on "Education and Training of Electrical Technicians." F. T. Chapman. Plaza Cinema, Swansea, 6 p.m.

## FRIDAY, JAN. 12

I.E.S. (Birmingham Centre).—Annual dinner. Imperial Hotel, Temple Street.

## MONDAY, JAN. 15

BIRMINGHAM ELECT. CLUB. — "Electrical Equipment in a Newspaper Office." F. Raybould.

I.E.E. (N.E. Radio Group).—"The Operation and Maintenance of Television Outside Broadcast Equipment." T. H. Bridgewater. King's College, Newcastle, 6.15 p.m.

I.E.E. (London).—Discussion on "Aesthetic Design in Transmission and Distribution Systems." Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Merseyside and N. Wales Centre).—"Railway Electrification: Design of Overhead Equipment." F. B. Kitchin. Town Hall, Chester, 6.30 p.m.

I.E.E. (N. Staffs Sub-centre).—"Scientific Aids to Production." H. S. Carnegie. King Edward Grammar School, Stafford, 7 p.m.

I.E.E. (Rugby Sub-centre).—"Performance of British Grid System in Thunderstorms." J. S. Forrest. E. Midlands Electricity Board, High St., 6.30 p.m.

I.E.E. (Western Supply Group).—"Design of Power Transformers to Withstand Surges due to Lighting." A. T. Chadwick, J. M. Ferguson, D. H. Ryder and G. F. Stearn. S. Wales Inst. of Engrs., Park Place, Cardiff, 6 p.m.

A.S.E.E. (Central London Branch).—"A Camera and the Engineer." G. E. Whalley. St. Ermin's Hotel, S.W.1, 6.50 p.m.

A.S.E.E. (Stockport Branch).—"Electric Traction." Mr. Kennerley. White Lion Hotel, Underbank, 8 p.m.

E.L.M.A.—Heavy Industries Conference. Midland Hotel, Birmingham, 2.30 p.m.

## TUESDAY, JAN. 16

I.E.S. (Liverpool Centre).—"Light, Colour and the Stage." E. Faraday. Merseyside and N. Wales Elect. Board, Whitechapel, Liverpool 1, 6.30 p.m.

INSTN. OF WORKS MANAGERS (Leicester and Notts and Derby Branches).—"Management and Productivity." J. Ayres of Brush Elect. Engrg. Co., Bull's Head, Loughborough, 7 p.m.

I.E.E. (London Measurements Section).—"Measurement of Interlaminar Resistance of Varnished-Insulated Silicon-Steel Sheet for large Electrical Machines." E. D. Taylor. Savoy Place, 5.30 p.m.

I.E.E. (Cambridge Radio Group).—"Use of Saturable Reactors as Discharge Devices for Pulse Generators." Cavendish Laboratory, 8.15 p.m.

I.E.E. (N. Midland Centre).—"Development and Design of Electrical Control Gear for Machine Tools." A. R. H. Thorne. Yorks Elect. Board, Ferensway, Hull, 7.30 p.m.

I.E.E. (N.W. Supply Group).—"Planning of an Electricity Board's Distribution System." G. O. McLean. Engineers' Club, Albert Square, Manchester, 6.15 p.m.

I.E.E. (S. Midland Centre).—Faraday Lecture on "Lamps and Lighting—Record of Industrial Research." L. J. Davies. Town Hall, Birmingham, 6 p.m.

## WEDNESDAY, JAN. 17

LUTON ELECT. SOC.—"Sound Reproduction." R. C. Patrick. Luton Chamber of Commerce, George St. West, 7.30 p.m.

INSTN. OF HEATING and VENTILATING ENGRS. (London Assoc. Members and Graduates Section).—"Costing for the Heating Engineer." L. Form. 178-80 Edgware Rd., W.2., 6.30 p.m.

I.E.S. (London).—First Trotter-Paterson Memorial Lecture. "Early Years of Illumination Engineering in G.B." J. W. T. Walsh. Royal Instn., Albermale St., W.1.

I.E.E. (London Educ. Circle).—Discussion on "Electric Wave Filters." Savoy Place, W.C.2, 6 p.m.

I.E.E. (Southern Centre).—Discussion at University College, Southampton, 6.30 p.m.

I.E.S. (Tees-Side Group).—"Decorative Lighting." L. H. Hubble. Cleveland Scientific and Tech. Instn., Corporation Rd., Middlesbrough.

BRITISH INSTN. OF RADIO ENGRS. (S. Midland Section).—"Ultrasonic Generators for High Powers." B. E. Noltingk. Public Library, Rugby, 7 p.m.

A.S.E.E. (Manchester Branch).—"Electronics." J. E. Fielden. Engineers' Club, Albert Sq., 7.30 p.m.

## THURSDAY, JAN. 18

ELECT. POWER ENGRS. ASSOC. (Midland Tech. Group).—"Supervisory Control." Elect. Bd. Showrooms, Darlington St., Wolverhampton, 7 p.m.

I.E.S. (Gloucester and Cheltenham Centre).—"Lighting of Architecture." G. Grenfell Baines. Cadena Cafe, High St., Cheltenham, 6.30 p.m.

I.E.E. (London Utilisation Section). — "Electrically Interlocked Guards on Machines." W. Fordham Cooper. Savoy Place, W.C.2, 5.30 p.m.

## FRIDAY, JAN. 19

MANCHESTER ASSOC. OF ENGRS.—"Electrical Aspects of Manchester—Sheffield Electrification Scheme." A. G. Hopking; "Mechanical Design and Construction of Manchester-Sheffield - Wath Electrification Scheme," H. O. Hinchliffe. Engrs. Club, Albert Sq., 6.45 p.m.

JNR. INSTN. OF ENGRS.—"Notes on Diesel Locomotives for Mines." A. O. Ellison. 39 Victoria St., S.W.1, 6.30 p.m.

## SATURDAY, JAN. 20

A.S.E.E. (Oxford Branch).—Lecture by J. L. Taylor. Title not known. Southern Elect. Board, George St., 3 p.m.

# TRADE MARKS

*This information is extracted from the Official Journal by permission of the Controller.*

**Kenwell.** 690,778. Class 7. Washing, ironing, drying and wringing machines. Small Pressure Die Castings (Bacup) Ltd., Lanehead Works, Lanehead Lane, Bacup, Lancs.

**Hivac.** With design 685,455. Class 9. Valves for use in electronic and thermionic apparatus and instruments. Hivac Ltd., Greenhill Cres., Harrow-on-the-Hill.

**Prestige.** 688,889. Class 9. 688,890. Class 11. Electrical apparatus for domestic and household purposes. Platers and Stampers Ltd., Colne Rd., Burnley, Lancs.

**Roadmaster.** 692,090. Class 9. Ammeters and testing apparatus for electric battery cells. Excelsior Motor Co., Ltd., Excelsior Works, Kings Rd., Tyseley, Birmingham 11.

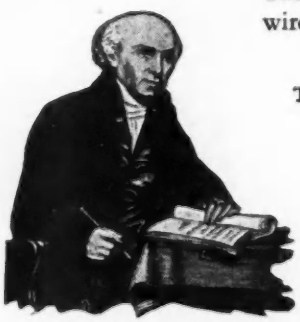
**Santalite.** B691,998. Class 11. Electric lamps and sets of wired electric lamps for decoration. J. N. Somers Ltd., Acton Market, Crown St., W.3.

*Architects:*
*Gotch, Saunders & Surridge*
*Kettering*

# The MISSION HOUSE Kettering

In this house on October 2nd, 1792 a meeting of fourteen men founded the Baptist Missionary Society. Dr. William Carey, the prime mover in planning this meeting, was appointed its first missionary to India. As a missionary, translator, scholar, writer and botanist, Dr. Carey was destined to fame far beyond the Christian world.

The Mission House has now been modernised and wired throughout with HENLEY CABLES.



*Electrical Contractors:*
**Thompson & Barlow Ltd., Market Place, Kettering.**

**HENLEY CABLES**

BY APPOINTMENT TO ELECTRIC CABLE MANUFACTURERS

**Famous for over a Century**

**W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1**

EXTENDING LIGHTING?

EXTENDING POWER?

# You'll need METROVICK Type MC fuse switchgear

Metrovick Type MC fuse switchgear provides complete flexibility and ease of assembly. From three standard bus bar chambers, standard fuse switch units, cable fittings and floor stands, any switchboard requirement can be met. All units are supplied jig drilled ready for assembly on site. Type MC fuse switchgear will provide a long trouble-free life and is available from stock. Write for full technical details and price list.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17.
*Member of the A.E.I. group of companies*

METROVICK *for all the Best in Switchgear*

F/V004

# CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

## TENDERS INVITED

### COUNTY BOROUGH OF BELFAST

*Electricity Department*

STORES

TENDERS are invited for the supply of the undermentioned materials:—

*Form No.*

1. Turbine oil.
3. Firebricks and fireclay for high temperature furnace requirements.
4. Spare parts for mechanical stokers, ash conveyors and soot blowers.
8. Glazed stoneware ducts and troughing, fibre ducts and covering tiles.
9. Feeder, section and street lighting control pillars.
11. Meters, instrument transformers and ancillary equipment.
14. L.T. fuse units, service cut-outs and accessories.
18. Electric washboilers.
19. Electric kettles.
22. Bare hard-drawn high conductivity copper conductors and P.B.J. insulated cables.
24. Transformer kiosks with high and low tension switchgear.
28. Bitite strip, prepared tape and rubber tape for joints, joint box compounds and refined bitumen.
31. Oilskin coats, tarpaulins, rubber jointing, etc.
35. Underground cable disconnecting boxes with pavement frames and covers.
36. Electric cooker circuit accessories.
37. Boiling plates for electric cookers.
38. Medium voltage H.R.C. cartridge fuse links.

*Note:* Form No. 31 is in respect of materials which shall be supplied to any Department of the Corporation.

Forms of tender, etc., may be obtained at the Electricity Department, East Bridge Street, Belfast.

Each tender, in sealed envelope, marked "Tender for Stores, Electricity Department," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, 2nd February, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall,
Belfast.
January 5, 1951. (H 316)

### BIGGLESWADE URBAN DISTRICT COUNCIL

*Within the Urban District*

STREET LIGHTING—TRUNK ROAD

TENDERS are invited for the following work:—

The provision and erection of 43 concrete columns, and the provision of lanterns, lamps and auxiliary equipment and wiring, in connection with the re-lighting (with 140 W sodium discharge lamps) of the above road.

Plans and general conditions of contract may be inspected, and specification, bill of quantities and form of tender obtained, from Mr. T. Wilson, M.I.Mun.E., Engineer and Surveyor, Church Street, Biggleswade, upon payment of a deposit of £2 2s., returnable on receipt of a bona-fide tender.

The council do not bind themselves to accept the lowest or any tender, and reserve the right to accept the whole or part of a tender.

Tenders, in plain sealed envelopes bearing no indication of the identity of the sender, and endorsed "Street Lighting" must reach the undersigned not later than 10 a.m. on Saturday, February 10, 1951.

A. R. BENNETT,
Clerk of the Council.

2 London Road,
Biggleswade, Beds. (H 302)

### THE HIGH COMMISSIONER FOR PAKISTAN

INVITES tenders for the supply of WIRELESS SETS NO. 22 KIT NO. 3, ETC.

Forms of tender, which are returnable by February 13, 1951, may be obtained from the Commercial Secretary, Supply and Stores Department, 40 Lowndes Square, London S.W.1, between the hours of 10 a.m. and 4 p.m., Mondays to Fridays, on payment of a fee of five shillings (not returnable) per tender. The reference PR 8358/GS should be quoted on all applications for tender forms. (H 289)

## APPOINTMENTS VACANT

### BRITISH ELECTRICITY AUTHORITY

*Eastern Division*

APPLICATIONS are invited for the following appointment:—

ASSISTANT MAINTENANCE ENGINEER (Mechanical) Little Barford Generating Station.

Applicants should have had engineering training, including manufacturing workshop experience, and be conversant with repairs and maintenance of a large Generating Station. Preference will be given to applicants who are associate members of a recognised engineering institution or hold similar qualifications.

Salary in accordance with the revised N.J.B. Schedule, Grade 8, Class "G," (£607 to £631 per annum).

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than 19th January, 1951. Envelopes should be endorsed "Assistant Maintenance Engineer (Mechanical)—Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (H 272)

### SOUTH WEST SCOTLAND ELECTRICITY BOARD

*Ayrshire Sub-Area*

APPOINTMENT OF THIRD ASSISTANT ENGINEER (CONSTRUCTION)

APPLICATIONS are invited from suitably qualified Engineers for the above position on the staff of the Sub-Area Engineer at Head Office, Kilmarnock.

Applicants should possess the Higher National Certificate in Engineering, or its equivalent, and have had experience in the design and construction of overhead lines and the laying of underground cables for voltages up to at least 11 kV and, preferably, 33 kV. They should also be experienced in the construction and equipment of sub-stations and general civil engineering works.

Salary in accordance with the N.J.B. Agreement, Grade 10, Class "G," £539-£561 per annum, subject to deductions in respect of income tax and superannuation.

Applications, stating age, whether married or single, giving full details of present position and previous experience, to be sent to the undersigned within fourteen days of the appearance of this notice.

A. E. ROOTS
Manager.

Greenholm Street,
Kilmarnock.
5th January, 1951. (H 322)

## BRITISH ELECTRICITY AUTHORITY

### South Wales Division

APPLICATIONS are invited for the following appointments, to be paid in accordance with the Revised National Joint Board Agreement:—

(*a*) JUNIOR ENGINEER in the Transmission Department at Divisional Headquarters at a salary in accordance with Class "AX/CX," Grade 9 (£375-£536 per annum).

(*b*) 5 ASSISTANT SHIFT CHARGE ENGINEERS at Llynfi Power Station, near Aberkenfig, at salaries in accordance with Class "F," Grade 9 (£538-£560 per annum).

When the extensions at present under construction at Llynfi Power Station are completed, the classification will be increased to "G" and the salaries for (*b*) will then be £571-£597 per annum.

All applicants should have served a recognised apprenticeship and should preferably have obtained the Higher National Certificate.

It would be considered an advantage if candidates for (a) had some experience in the maintenance and operation of overhead lines and sub-stations, whilst for (b) experience in the operation of a modern power station using pulverised fuel boilers is essential.

The appointments will be superannuable under the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than January 22, 1951, in sealed envelope endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport, Cardiff.
January 1, 1951. (H 299)

## BRITISH ELECTRICITY AUTHORITY

### London Division

APPLICATIONS are invited from suitably qualified and experienced engineers to fill the vacancy of (a) BOILER HOUSE SHIFT CHARGE ENGINEER or (b) ASSISTANT BOILER HOUSE SHIFT CHARGE ENGINEER at Barking Generating Station.

The successful candidate will be responsible to the Engineer-in-Charge for the operation of Boiler House plant and should have had a thorough technical training and have had experience with large boiler units.

The salary—in accordance with the revised N.J.B. Schedule—will be for (a) Class "M," Grade 9 (£819 p.a.), inclusive of London Allowance, and for (b) Class "M," Grade 11 (£710 17s. p.a.), inclusive of London Allowance.

The appointments will be superannuable under the terms of the British Electricity Authority and Area Boards' Superannuation Scheme.

ENGINEERING DRAUGHTSMAN
WEST HAM GENERATING STATION

Applications are invited for the above position from candidates who have had a good training in connection with Power Station Maintenance. The salary, which is provisional and subject to negotiation with the appropriate organisation, will range from £400 to £500 according to qualifications. The appointment will be superannuable under the terms of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications for all the foregoing vacancies, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within seven days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(H 309)

## BRITISH ELECTRICITY AUTHORITY

DIVISIONAL CONTROLLERS

APPLICATIONS are invited for the post of Divisional Controllers. There will be a vacancy in the near future in the East Midlands Division with headquarters at Nottingham and at the end of 1951 a further vacancy in the London Division. It is proposed also to consider candidates for any other vacancies which might arise during the course of the next two or three years.

Candidates should have extensive experience and knowledge of large scale generation and transmission of electricity and in addition wide administration experience and should be conversant with the negotiating machinery connected with the electricity supply industry.

The salary range for these appointments, which are superannuable, is £2,500 to £3,250 per annum (London £1,500 per annum) and the successful candidates will be appointed at a salary within this range in accordance with qualifications and experience.

Applications, giving age, full details of qualifications and experience, should be submitted to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, not later than January 26, 1951. Please quote reference AE 124. (H 310)

## BRITISH ELECTRICITY AUTHORITY

### South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of STATION CHEMIST at Kilmarnock Generating Station.

Applicants should be fully qualified industrial Chemists with practical experience of fuel, water and oil testing. A knowledge of boiler chemistry for high steam pressures and temperatures will be an advantage.

The terms and conditions of service will be those approved by the National Joint Board and the Grade and Salary which are provisional and subject to agreement by the National Joint Board will be Class "F," Grade 7, being at the rate of £625/£634/£643 per annum.

The post is superannuable and subject to a satisfactory medical examination.

Applications, stating age, qualifications and experience should be forwarded on Form A.E.6 to the Divisional Secretary, British Electricity Authority, British Electricity House, 168 Broomhill Drive, Glasgow W.1.

The closing date for applications is January 25, 1951.

A. CHRISTIANSON,
Divisional Secretary.

December 29, 1950. (H 297)

## BRITISH ELECTRICITY AUTHORITY

### South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of STATION CHEMIST at Yoker Generating Station.

Applicants should be fully qualified industrial Chemists with practical experience of fuel, water and oil testing. A knowledge of boiler chemistry for high steam pressures and temperatures will be an advantage.

The terms and conditions of service will be those approved by the National Joint Board and the Grade and Salary which are provisional and subject to agreement by the National Joint Board will be Class "F," Grade 7, being at the rate of £625/£634/£643 per annum.

The post is superannuable and subject to a satisfactory medical examination.

Applications, stating age, qualifications and experience, should be forwarded on Form A.E.6 to the Divisional Secretary, British Electricity Authority, British Electricity House, 168 Broomhill Drive, Glasgow W.1.

The closing date for applications is January 25, 1951.

A. CHRISTIANSON,
Divisional Secretary.

December 29, 1950. (H 296)

## HIS MA.ESTY'S COLONIAL SERVICE

CYPRUS

A VACANCY exists for an ELECTRICAL AND MECHANICAL ENGINEER in the Public Works Department, Cyprus, in the salary scale £828 to £1,104 (gross) with a cost-of-living allowance varying at present from £37 per annum for a single man to £138 per annum for a married man with three children. Appointment will be on two years' probation for pensionable employment, the initial salary to be determined by age, war service and approved professional experience.

Free passages are provided for the officer, his wife and up to three children once each way in respect of each tour of 24 months. Furnished quarters, if available, are provided at a rent of approximately £43 to £57, according to salary, and, if they are not, a similar allowance is payable. Vacation leave is granted at the rate of 3½ days for each month of resident service.

Candidates, preferably over the age of 35, should be Associate Members of the Institution of Electrical Engineers, with long practical experience of electrical and mechanical work. They should write for further particulars and a form of application to the Director of Recruitment, Colonial Service, Colonial Office, Sanctuary Buildings, Great Smith Street, London S.W.1, mentioning this newspaper and quoting the reference No. 27324/10/50. (H 295)

## SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT (Industrial Power) at Area Board Headquarters, Bristol. Applicants, who should possess either a degree in engineering or membership of the Institution of Electrical or Mechanical Engineers, must have experience in the electrical supply industry, in particular covering the application of electricity to industrial uses and the preparation of estimates and agreements for industrial supplies. The successful candidate will be required to partake in discussions with industrial consumers; advise on the selection of plant and equipment; prepare and negotiate supply agreements.

The commencing salary will be £752 per annum in accordance with Class "AX", Grade 2, of the National Joint Board Salary Agreement.

Applications, giving full details, including age, qualifications and experience, and present salary, should be submitted to the Assistant Secretary (Establishments), South Western Electricity Board, Electricity House, Colston Avenue, Bristol 1, within 14 days. (H 318)

## YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments :—

### *No. 4 (Leeds) Sub-Area*

DISTRICT CONTROL ENGINEER (Leeds). Vacancy No. 90/50.

Applicants should have the technical qualifications of a graduate member of the Institution of Electrical Engineers, and have operational and control room experience with a large Urban and Rural Electricity Supply system. A knowledge of protective equipment and safety regulations is also desirable.

The successful candidate will be responsible during his shift for the control of all switching operations in the Leeds district. The hours of duty are based on a rota of shifts covering a 24-hour period.

Salary : N.J.B. Schedule, Class " J," Grade 9, £646 to £674 per annum.

THIRD ASSISTANT DISTRICT ENGINEER (Leeds). Vacancy No. 2/51.

Applicants must have a sound practical training and experience in the operation, maintenance, planning and construction of h.v. and l.v. underground and overhead networks, substation plant and ancillary apparatus of a large undertaking. Preference will be given to candidates who hold an Engineering Degree or equivalent qualification.

Salary : N.J.B. Schedule, Class " J," Grade 9, £646 to £674 per annum.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, near Leeds, within fourteen days of the appearance of this advertisement.

### *No. 6 (Hull) Sub-Area*

JUNIOR ENGINEER (Goole District). Vacancy No. 3/51.

Applicants should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have had training and experience in the construction, operation, and maintenance of h.v. and l.v. overhead and underground distribution systems.

The successful applicant will be required to reside in Goole and carry out standby duty.

Salary: N.J.B. Schedule, Class " E," Grade 14, £375 to £387 per annum.

JUNIOR ENGINEER (Hull District). Vacancy No. 3/51.

Applicants must have had a good technical education and experience in the construction, operation, and maintenance of h.t. and l.t. underground and overhead distribution systems. Preference will be given to those possessing the Higher National Certificate in Electrical Engineering or equivalent qualifications.

The successful applicant will be required to reside in Hornsea and carry out standby duty.

Salary : N.J.B. Schedule, Class " H," Grade 17/14, £375 to £451 per annum.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, within fourteen days of the appearance of this advertisement.

### *No. 7 (Grimsby) Sub-Area*

SECOND ASSISTANT DISTRICT ENGINEER (Grimsby) Vacancy No. 86/50.

Applicants must have had a sound practical training and considerable experience in the operation, maintenance, planning, and construction of high and low voltage underground and overhead networks, substation plant, and ancillary apparatus. Preference will be given to candidates who are corporate members of the Institution of Electrical Engineers, or who hold an Engineering Degree, or equivalent qualification.

Salary : N.J.B. Schedule, Class " E,"Grade 7, £579 to £609 per annum.

THIRD ASSISTANT ENGINEER (Distribution Design). Vacancy No. 85/50.

Applicants must have had a sound practical training and experience in the operation, maintenance, planning, and construction of high and low voltage underground and overhead networks, substation plant, and ancillary apparatus. Preference will be given to candidates who hold an engineering degree or equivalent qualification.

Salary : N.J.B. Schedule, Class " G," Grade 10, £539 to £561 per annum.

Applications, stating the above vacancy numbers, and, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement. (H 323)

**BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2**

## SOUTH WALES ELECTRICITY BOARD

### *West Central Sub-Area*

APPLICATIONS are invited for the position of GENERAL FOREMAN on the establishment of the District Commercial Manager, Llanelly, Carmarthenshire.

The duties will include the supervision of all installation work, of all repairs and maintenance of consumers' apparatus and apparatus on hire, and of wiring of public lighting fittings; taking charge of electricians, meter fixers, street lighting attendants, etc., and the organisation of the Commercial Department's Transport.

The conditions of employment applicable to this appointment are as laid down by the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay being 3s. 3d. per hour for a 44-hour 5-day week.

Applications should be addressed to the undersigned so as to reach him within 14 days of the publication of this notice.

G. R. T. EDWARDS,
Sub-Area Manager.

Ystrad Road
Fforestfach,
Swansea. (H 319)

## SOUTH WALES ELECTRICITY BOARD

### *West Central Sub-Area*

APPLICATIONS are invited for the positions of ELECTRICIANS in the Commercial Departments of the Board's Port Talbot, Neath, Swansea and Llanelly Districts.

The duties will include the erection, testing, connection and maintenance of all classes of electrical apparatus and the carrying out of all classes of wiring with and without tubing.

The conditions of employment applicable to these appointments are as laid down by the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay being 2s. 11d. per hour for a 44-hour 5-day week.

Applications, stating age, qualifications, experience and present position, should be addressed to the undersigned so as to reach him within 14 days of the publication of this notice.

G. R. T. EDWARDS,
Sub-Area Manager.

Ystrad Road,
Fforestfach,
Swansea. (H 320)

## MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

### GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the appointment of General Assistant Engineer in the Engineering Section at No. 3 Sub-Area Headquarters, Chester, at a salary in accordance with the revised National Joint Board Agreement, Grade 13 (at present Class "G," £433-£449 per annum).

Applicants should, preferably, possess the Higher National Certificate in Electrical Engineering. Preference will be given to candidates with some experience of h.v. and l.v. distribution, drawing office, and field survey work.

The appointment is superannuable and subject to a medical examination.

Applications should be made on a form obtainable by written request from the Manager, No. 3 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Newgate Street, Chester, and should be returned not later than January 27, 1951.

JAMES RANKIN,
Secretary.
(H 321)

## NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

### *Aberdeen Area*

APPLICATIONS are invited for appointment as MAINS ASSISTANT from persons having experience of change-over of system from D.C. to A.C. as applied to distribution work.

Applicants should, preferably, hold technical qualifications of Higher National Certificate Standard.

Salary in accordance with Grade 9, Class "F," of the revised National Joint Board Schedule (£538 to £560 per annum).

Applications should be addressed to the undersigned, not later than 10 days after the publication of this advertisement.

ALEXR. GARDNER,
Area Manager.

Area Offices,
Millburn Street, Aberdeen. (H 317)

ASSISTANT ELECTRICAL ENGINEER required for Iron and Steel Works. Applications, giving age, details of education, experience, positions held (with dates), and including photograph, should be submitted, together with salary required, to Box No. 2065, Electrical Times. (H 313)

**RESIDENT CONSTRUCTION ENGINEER**

Required by the consulting engineers to the Malta Government to supervise, on their behalf, the erection, installation and testing in Malta of a complete steam power plant comprising 3 by 5,000 kW sets and 3 by 70,000 lb oil-fired boilers and associated equipment. The successful applicant would also be responsible for supervising the laying of a new 3-phase distribution system, and the remodelling of sections of the existing single-phase system for 3-phase working (11 kV and 400 V).

Applicants should be between 30 and 45 years old, Graduate Members of one of the senior Institutions, or have similar qualification, and have had previous constructional, operational and administrative experience in the electricity supply or allied industry.

The appointment is temporary for approximately two years, which may be extended by agreement. Salary from £1,250 p.a., according to qualification. Free first-class passage out and home and local travelling expenses at Malta Government rates.

**Apply, with full details of previous experience, to Preece, Cardew and Rider, 8 and 10 Queen Anne's Gate, Westminster, London S.W.1.** (H 290p)

A CONTRACT ENGINEER is required for a permanent post in the Union of South Africa. Applicants should have had experience in the laying and jointing of power cables up to 33 kV and also of the installation of concrete and wood pole overhead lines. A single man is preferred and the holding of Ordinary and Higher National Certificates would be an advantage.—Please apply in writing to the Contract Manager, W. T. Henley's Telegraph Works Co. Ltd., 51-53 Hatton Garden, London E.C.1. (H 244)

A FEW attractive vacancies for DRAUGHTSMEN exist at the Liverpool works of the English Electric Co. Ltd. The work is of an electro-mechanical nature, but any draughtsmen with experience in the design and detailing of mechanisms or welded fabrications, or, in fact, any kind of medium mechanical equipment will be considered. Excellent opportunities for advancement in this interesting field.—Please write, giving full details and quoting Ref. 135B, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (H 239)

A RECENTLY opened drawing office at Bradford requires additional DRAUGHTSMEN for work on electrical control gear. Draughtsmen with previous electrical or mechanical experience are invited to apply for these positions which are permanent, progressive and pensionable.—Please write, quoting ref. 138B, and giving full particulars, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (H 213)

APPLICATIONS are invited for a number of vacancies for ELECTRICAL ENGINEERING SENIOR DRAUGHTSMEN for the installation of electrical equipment in large civil and military aircraft. Some knowledge of electronic equipment is desirable and possession of O.N.C. or H.N.C. (Elect.) preferable. The vacancies are for Cricklewood and Radlett (Herts) drawing offices. Further vacancies exist at Cricklewood only for Junior Electrical Engineering Draughtsmen for detailing the above work. The positions offer excellent opportunities for advancement to keen men.—Write, stating age and full details of experience and qualifications, to Staff Officer, Handley Page, Ltd., Cricklewood, London N.W.2. (H 177)

**CANADA—ONTARIO**

**LARGE ELECTRICAL COMPANY REQUIRES IMMEDIATELY**

**10 Draughtsmen** fully qualified for work on switchgear and industrial control apparatus.

**3 Design Engineers** with at least 5 years' experience on power transformers, 250 kVA and up.

**10 Detail Draughtsmen** with experience on power transformers.

**10 Tool and Die Makers** for work on lamination dies. At least 10 years' experience, including apprenticeship.

Applicants must be under 35 and prepared to emigrate to Ontario. Transportation advanced if required. Call or write full details,

**Dept. C.G., Immigration Department., Ontario House, Charles II Street, London S.W.1.** (H 301p)

Applications are invited for the following positions, for which first-class Engineers are required:

**ELECTRICAL CONTRACTING ESTIMATORS**

Accustomed to large modern types of Industrial and Commercial Electrical Installations.

**OUTSIDE PLANNING AND SUPERVISING ENGINEERS**

For Electrical Contracts, having wide experience all types Electrical Installation.

**COMPETENT JOURNEYMAN ELECTRICIANS**

Fully Skilled Industrial — Domestic Installations.

*Apply to*

**LEE, BEESLEY & CO., LTD.,**
**6, WARWICK ROW, COVENTRY**

(H 334p)

ASSISTANT CHEMIST required for Works Laboratory. Age 25-30. Minimum qualifications—Intermediate B.Sc. or H.N.C., also industrial analytical experience.—Apply: Works Manager, Pirelli-General Cable Works Ltd., Eastleigh, Hants. (H 307)

CHIEF STORES CLERK required with knowledge of stockkeeping and bookkeeping systems and able to work without supervision. Promotion assured for right man. Superannuation scheme.—Write, giving full particulars, to Southern Sales Manager, Ekco-Ensign Electric Ltd., 5 Vigo Street, London W.1. (H 329)

CHIEF TRANSFORMER DESIGNER. Experienced in design of units of 10-15 MVA up to 132 kV, and with on-load tap changing and impulse work. Salary in accordance with qualifications and experience.—Apply, Technical Director, Bryce Electric Construction Co., Ltd., Kelvin Works, Hackbridge, Wallington, Surrey. (H 254)

DRAUGHTSMAN, familiar with light electrical mechanism or instruments and preferably with some circuit experience, required by Dowty Equipment Ltd., Arle Court, Cheltenham, for development work on aircraft controls. Age 21-25. Higher National Certificate preferred.—Write to Personnel Manager, stating age, experience and salary required. (H 303)

DRAUGHTSMEN. Britain's leading design consultants and contractors require urgently Senior Switchgear Draughtsmen, also Juniors to train as Switchgear Draughtsmen. Good salaries and prospects of advancement for suitable applicants. Pension scheme.—Write in confidence, quoting reference E.T., to John A. Smith Ltd., 24 Lichfield Street, Wolverhampton. (H 335)

DRAWING OFFICE STAFF with experience of electrical cooking design required by Birmingham manufacturers of industrial equipment. State experience, age and salary required.—Box No. 2053, Electrical Times. (H 283)

ELECTRICAL ENGINEER with experience of design of control gear for industrial and traction motors wanted for Sales Office of Resistor Manufacturer near London to handle enquiries and application design.—Please state age, salary and experience to Box No. 2041, Electrical Times. (H 226)

ELECTRICAL ENGINEER (Junior) for works engineer, department, with experience in the preparation of schemes for lighting and installation of general electrical equipment. Higher National Certificate desirable. Salary according to age and experience.—Apply, Box No. 2043, Electrical Times. (H 247)

ELECTRICAL ENGINEER to be responsible for control gear testing and electrical maintenance in a small works in the Manchester district. Interesting variety of work with good prospects.—Box No. 2061, Electrical Times. (H 311)

ELECTRICAL ENGINEER required to take charge of General Works Electrical Distribution including a.c. and d.c. systems. Successful applicant will be solely responsible to the Works Engineer for installation and maintenance of all equipment, including h.t. and l.t. switchgear, mains, generating plant, etc. Applicants must be able to control labour and should have received some practical and technical training. Age 30 to 40 years.—Apply in writing giving details of experience in chronological order, stating salary required to the Administrative Manager, Chance Brothers Limited, Smethwick. (H 337)

ELECTRICAL ENGINEERING DRAUGHTSMAN required for Works with M.D. of 4,000 kVA, experienced in sub-station layouts and works electrical services (a.c. and d.c.) including lighting. Some mechanical experience would be an advantage. Five-day week and pension fund.—Apply, stating age, qualifications, details of experience and salary expected, to The Avon India Rubber Co. Ltd., Melksham, Wilts. (H 222)

ELECTRICIAN WANTED, experienced, by Electrical Contractors in Westminster area. Good prospects. —Write, Box No. 2067, Electrical Times. (H 314)

ELECTRICIAN WANTED, experienced, by Electrical Contractors in West London area.—Write, Box No. 2069, Electrical Times. (H 315)

ENGINEER SALES REPRESENTATIVE required for London area by an old established firm of carbon brush manufacturers. Applicants should be between 25 and 35 years of age, have a good knowledge of machine design, preferably with sales experience, and be willing to undergo training for subsequent responsible position.—Box No. 2055, Electrical Times. (H 287)

EXPERIENCED SENIOR DRAUGHTSMEN urgently required by a well-known manufacturer for employment in the Midland and London areas. Excellent opportunities for men experienced in switchgear layout and design. These are senior vacancies carrying salaries of up to £600 per annum, and good possibilities exist for the provision of accommodation in the Midland area for suitable married applicants.—Write, giving full details, quoting Ref. ADA, to Box No. 2037, Electrical Times. (H 224)

FERRANTI LIMITED invite applications for senior appointments of graduate engineers with industrial experience in the design of electricity meters. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood. Please quote reference M.E. (H 324)

SALES REPRESENTATIVES (four) (a) Yorkshire, (b) Midlands, (c) South Wales, (d) South Coast, for well-known fluorescent cold cathode light fittings manufacturers. Progressive position for keen and energetic man with proved qualifications and connections.—Applications, stating age, experience, etc., will be treated in strict confidence, and should be addressed to Micramatic Ltd., Wootton Mount, Bournemouth. (H 252)

TEST ROOM require experienced man with some electrical training for Rotating Electrical Machines up to 6 kW; large variety of designs. South-east London.—Box No. 2039, Electrical Times. (H 225)

TRANSFORMER DESIGNERS. Senior, experienced in design of units 10-15 MVA, with experience of on-load tap changing gear and preferably with some experience of impulse work on such units. Also Junior, with some experience. Salaries in accordance with qualifications and experience.—Apply, Technical Director, Bryce Electric Construction Co., Ltd., Kelvin Works, Hackbridge, Wallington, Surrey. (H 253)

WANTED by Public Company for Lower Burma—QUALIFIED ELECTRICAL/MECHANICAL ENGINEER with experience of hydro-electric and centrifugal pumping plants and workshop practice—single man preferred—furnished quarters, passage paid out and home —salary dependent upon experience plus cost of living allowance. Applications stating age, experience and salary required, with references and copies testimonials to Box F.Q.U., c/o 95 Bishopsgate, London E.C.2. (H 338)

## APPOINTMENTS WANTED

A CHARTERED ELECTRICAL ENGINEER, A.C.G.I., A.M.I.E.E., resident in London, desires change and seeks position of senior responsibility with scope for initiative. Sixteen years' first-class experience with leading manufacturers, home and abroad, in production, contracts, sales. Proved organising ability, experienced in general administration, supervision of staff, publicity, preparation and adjudication of comprehensive specifications and tenders.—Box No. 2051, Electrical Times. (H 282)

ADVERTISER, age 37, over 20 years' experience all branches, wishes to emigrate to Australia. Would be pleased to hear from British firms having vacancies in that country.—Box No. 2057, Electrical Times. (H 288)

## WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel. 32996), electrical engineers and winding specialists. Distance no object. (F 739)

BARREL PLATING CAPACITY AVAILABLE. Cadmium, copper, tin, and electro-galvanizing.—Packer and Son, Sion Place, Clifton, Bristol 8. Phone 38368. (H 336)

CASTINGS. Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (H 268)

**10/6** VAC. fields rewound; 19/6 vac. armatures rewound; 45/- complete rewind and overhaul vac. motors (3 to 7 days' service). Commutators and bearings extra. Also portable tools, etc. All motors from 1/20th to 200 h.p. rewound and reconditioned by J.B. Electric Ltd., 199 Manchester Road, Broadheath, Altrincham, Cheshire. (Tel.: Altrincham 2146.) (H 219)

## WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

LISTER RECONDITIONED DIESEL ENGINE, approximately 30 h.p.—Send full details and price to Coates Bros. and Co. Ltd., St. Mary Cray, Kent. (H 330)

WANTED, one 250V single-phase, 50-cycle, 25 kVA ALTERNATOR with automatic voltage control and exciter, suitable for direct coupling to 40 b.h.p. diesel engine at 1,000 r.p.m.; or alternatively a plant to the above requirements complete with prime mover (diesel).—Box No. 2063, Electrical Times. (H 312)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London, N.1. (A 13)

## AGENCIES

MANUFACTURERS' AGENTS ASSOCIATION, INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 7)

## FOR SALE

### *CABLES & WIRE*

CABLE. T.R.S., 4-core flexible, 14/0076. Brand new, £2 per 100 yds. Large quantities v.i.r. and t.r.s. at bargain prices.—Boyce, Weir and Co., 778 New Hey Road, Huddersfield. (H 327)

LARGE stocks P.I.L.C., Armoured and Unarmoured CABLES, suitable for mines and quarries, also light duty flexibles, users only.—Inquiries to Box No. 2059, Electrical Times. (H 305)

ONE wire lacquering plant by Spooner, gas-heated, 8-line, with traversing type motorised take-off.—Hipprum Wires Ltd., Hipperholm, Halifax. (H 306)

TOUGH RUBBER CABLE available, all sizes and types; non-standard lengths (25 yds to 50 yds). Special prices quoted for regular buyer. Must be a user. Guaranteed strictly to BSS.7.—Box No. 1967, Electrical Times. (H 65)

## DOMESTIC APPLIANCES

**"MORAHEAT" IMMERSION HEATERS**

16" to 42" with Satchwell Thermostat, all voltages and intermediate loadings, fully guaranteed, no P.T.

**ATTRACTIVE TRADE TERMS**

*Apply Agent:*

**W. TYLER, 20 Finnemore Road, Little Bromwich, Birmingham 9.** (G 817p)

COMMERCIAL IRONS for all purposes.—Donaldsons Wireless Electric Irons, 31 Sloan Street, Leitn. (A 163)

IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed and immediate delivery. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

## ENGINEERING PLANT & MATERIALS

WELDING PLANT. Several Motor Generator Arc Welders, single, double and multi operator up to 600 amps. Input 400/440 V, 3-phase, 50 c/s. Also several single and double operator transformer arc welders. All modern units by well known makers. Attractive prices. Full details.—Write: Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 294)

## GENERATING PLANT

"ALLEN" GENERATOR for sale. 125 kW, 250 V d.c., 500 amps, driven by 200 h.p. vertical diesel engine, compressed air starting with compressor and slate panel, switchboard connections, tank. Inspect at works W. England.—F. J. Edwards Ltd., 359 Euston Road, London N.W.1. (H 284)

DIESEL ALTERNATOR SETS from stock: 400/440 V, 3-phase, 50 c/s, 167 kVA "Waukesha/G.E.C.," 1,000 r.p.m.; 150 kVA "Petter/Brush," 500 r.p.m.; 135 kVA "Blackstone/Metro-Vick," 500 r.p.m.; 150 kW "General Motors/Westinghouse," 1,000 r.p.m.; 100 kVA "Deutz," 1,000 r.p.m.; 60 kVA "Mclaren/Brush," 1,000 r.p.m.; 65 kVA "Meadows/McFarlane," 1,500 r.p.m.; 62.5 kVA "McLaren/Bruce-Peebles," 1,000 r.p.m.; 50 kVA "National/Bruce-Peebles," 750 r.p.m.; 20 kVA "Lister/Metro-Vick," 1,000 r.p.m. Full details with price post free on request. —Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 292)

FOR Sale, 30 kVA Gardner Diesel GENERATING SET, direct coupled to Brush A.C. Generator, 415/230 volts, 3-phase and neutral, complete with necessary control equipment; first-class condition.—Frey, 43a Church Street, Stoke-on-Trent. (H 286)

FOR Sale, Diesel-driven GENERATING SET, 25 amp, 110 V.—B. G. Plant (Sales Agency), Ltd., Watlington, Oxon (Phone: Watlington 44). (H 300)

**GENERATING SET**

Two Screen Protected Direct Current Horizontal Spindle continuously rated GENERATORS, each 10 kW 110 V, as a compound wound machine, 10 kW 145 V as a shunt machine, speed 1,000 r.p.m. Provided with two end bracket-type grease lubricated ball and/or Roller bearings, terminal box for plain cable and free shaft extension, one 3-panel open flat back type SWITCHBOARD, two automatic starters, driven by two McLAREN RICARDO Diesel oil engines, type L.M.R. 2-cylinder, Nos. 30150 A and B, each complete with flywheel and guard, governor, water circulating pump, fuel filter, radiator with fan and guard. Lubrication oil cooler mounted on radiator, lubrication oil filter, exhaust manifold silencer, exhaust pipe, air cleaner.

This equipment is new and unused, and was purchased in June, 1946, for the sum of £1,460, and has been carefully stored since its purchase, and can be inspected at Tallington, near Stamford, Lincs. Offers for the equipment should be made to

**DOW-MAC (PLANT & TRANSPORT) LTD.**

**TALLINGTON, STAMFORD, LINCS.**

Telephone: Peterborough 4501. (H 256p)

GENERATOR for sale, 220 V d.c., 130 amps with control panel. Driven by "Tangye" 34 b.h.p. single-cylinder horizontal diesel engine. Inspection at works in W. England.—F. J. Edwards Ltd., 359 Euston Road, London N.w.1. (H 285)

STEAM DRIVEN GENERATING SETS.

7,500-kW Turbo Alternator by British Thomson-Houston, of the impulse type with a 2-stage Curtis wheel and 7 impulse stages, fitted with stainless steel and bronze blading and designed for use with steam at 180/200 lb. sq. in., 550/574° F. temperature, exhausting to a vacuum of 23 in., speed 3,000 r.p.m. and direct coupled on combined baseplate to 9,400 kVA alternator; 0·8 power factor, 6,300/6,600/3/50 with exciter. The surface condenser by W. H. Allen has cooling surface of 15,500 sq. ft. and is fitted with special brass tubes. Motor-driven Circulating Pump and Condensate Pump are fitted together with 2-stage steam jet air ejection. Auxiliary electric supply is 400/440/3/50.

2,500 kW (3,125 kVA) pass out Turbo Alternator set by Howden/Siemens, for 480/3/50, speed 3,000 r.p.m. Steam pressure 195 lb. sq. in., temperature 510° F., passing out 50,000 lb. steam per hr. at 40 lb. pressure. Mirrlees surface condenser and condenser pump.

700 kW geared Turbo Alternator set by W. H. Allen/Crompton Parkinson, for 440/3/50, 4 wire, 0·8 P.F., speed 6,000/1,000 r.p.m., through reduction gear. Turbines designed for steam at 280 lb. sq. in. 30 lb. back pressure, superheat 50° C., steam consumption 41·7 lb. per kW hr. Alternatively 200 lb. sq. in., 10 lb. back pressure, steam consumption 42 lb. kW hr., then giving max. output of 620 kW. Overhauled by makers 1948. Can be reconnected for 220/3/50.

Two 600 kW (750 kVA) geared Turbo Alternator sets by G. and J. Weir/E.C.C., for 400/440/3/50, 4 wire, speed 4,000/1,000 r.p.m. through David Brown reduction gear. Steam pressure 150 lb. sq. in., 15 lb. back pressure, suitable for pressures up to 190 lb. sq. in. With switchboard and direct coupled exciter.

George Cohen, Sons and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070 and Stanningley near Leeds. Tel.: Pudsey 2241. (H 304)

**30** kVA DIESEL ALTERNATOR SET. Leyland engine, 230/400/3/50.—Boyce, Weir and Co., 778 New Hey Road, Huddersfield. (H 328)

**44** kVA GENERATING SET, 400 V, 3 ph, by Bruce Peebles, driven by two Leyland 6 cyl. 100 h.p. Diesels which run separately, one as standby, switch, meter panel, battery starting, never used. Brand new condition, minor completion needed. Room wanted; first reasonable offer.—F. W. Frazer, St. Albans Rd., Cheam, Surrey, Fairlands 7880. (H 243)

## METERS

A.C. and d.c. Quarterly and Prepayment METERS.—Electric Meter Co., Castor Road, Brixham. (H 332)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

HOUSE SERVICE METERS, from 5s. Guaranteed two years.—Electric Meter Co., Castor Road, Brixham. (H 333)

METERS a.c. and d.c., new and reconditioned, all types. Quarterly, single and 3-phase, 3 and 4-wire, 2½ to 1,000 amps. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amps. M.D.I. Billiards Switches, Rent Collectors. Prices from 5/-, carriage paid. Two-year guarantee. Immediate delivery.—Illustrated catalogue from The Electric Meter Company, Castor Road, Brixham. (H 331)

## MOTORS & STARTERS

A.A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

**ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.**

**STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC**

Any voltage, new, short delivery, all types of revolving electrical power.

**ELECTROPOWER COMPANY LIMITED**

Kingsbury Works, Kingsbury Road, London N.W.9. Telephone: COLindale 4621/2. (D 17p)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

A.C. and D.C. Motors, Alternators, Generators, Generating Sets, Transformers, Welders, Plating equipment, Control Gear, Switchgear, Portable Electric Tools, etc. Write for current electrical stock list, post free.—Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 291

A.C. 75 h.p. E.E. 750 r.p.m. SLIP RING MOTOR, ball and roller bearings; 400/3/50 with Ellison starter; 60 h.p. as a tove; both motors 3-bearing type; reasonable price.—Boyce, Weir and Co., 778 New Hey Road, Huddersfield. (H 326)

BRAND NEW A.C. Motors from stock: 1/3 to 150 h.p. Slip Ring and Squirrel Cage, 400/440 V. 3-phase, 50 c/s at 750, 1 000 and 1,500 r.p.m., with or without control gear. Immediate despatch from stock. Attractive prices. —Full details post free from Thos. W. Ward, Ltd., Albion Works, Shemeld. Phone 26311 (ext. 347). (H 293)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

RECONDITIONED D.C. MOTOR 10 h.p., 440/480 V. 550 r.p.m. with isolator. Starter and rails. Price £30 Ex Works. Many others—A. C. Dibley & Co. Ltd., 72 Granville Road, Cricklewood, N.W.2. (H 308)

## SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

## TRANSFORMERS & CONVERTORS

100 NEW low voltage TRANSFORMERS for sale. Made by G.E.C. Primary tapped every 10 volts from 200/250 V. Secondary 30 V 1·1 kVA. These transformers should be suitable for the manufacture of incubators, brooders, soil warming outfits, portable welding plants, etc. Further details and prices on application.—Box No. 2047, Electrical Times. (H 259)

## LIGHTING EQUIPMENT

BERKSHIRE Country House Lighting Plant, petrol driven, will run on T.V.O., recently overhauled: perfect condition; can be inspected any time (Phone: Last, Newbury 888). (H 298)


**THERMAL FLASHERS**

All Types

LAMPHOLDER, BLOCK, ETC

**C and R**

**ELECTRICAL ACCESSORIES**

42 THAMES ST., HAMPTON, MIDDX

**Obtainable from all Leading Wholesalers**

*Telephone: Molesey 4576*

(H 61p)


PURLEY CHOKES AND BALLASTS. Our 80-w. Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanchard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

## UNCLASSIFIED

### DISTRICT MENTAL HOSPITAL, CASTLEBAR

ELECTRIC LIGHTING PLANT FOR SALE

TENDERS are invited for the purchase of the undermentioned Electrical Engines (makers, Messrs. W. and H. Allen, Bedford, England), Generators, etc.

Two 50 h.p. Vertical Crude Oil Engines, revs. 275 per minute; direct coupling to generators. Two Generators, d.c., 210V, 125/119 amps, revs. 275 per minute, 25 kW.

Four Air Bottles with pressure gauges 150 lbs; 2 Fuel Tanks; 2 d.c. Motor Circulation Pumps, 210V, revs. 1,250, 2·6 amps, ½ b.h.p.; 1 Booster Set, motor 7 b.h.p., 210V, 29·2 amps, revs. 1,250; 1 Booster, 10/110V, 40 amps, revs. 1,250, 44 kW.

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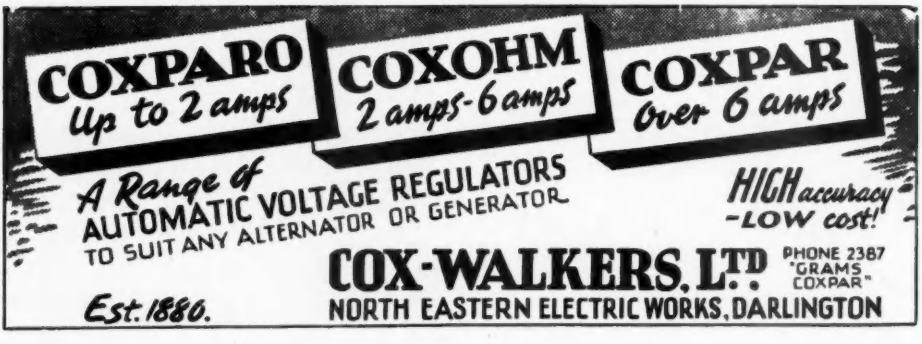

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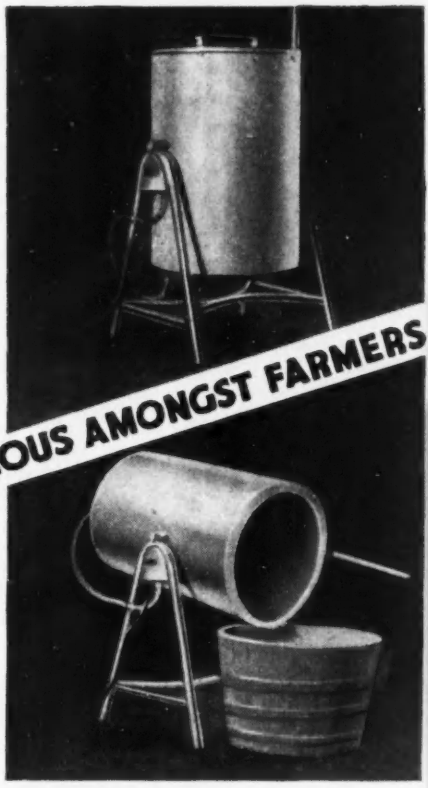

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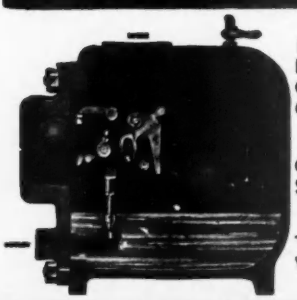

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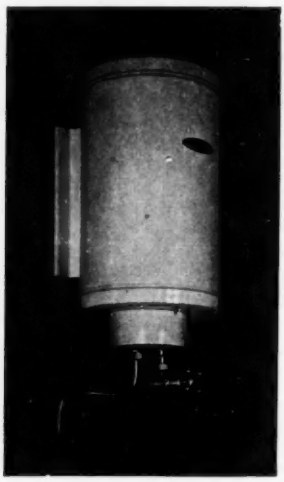

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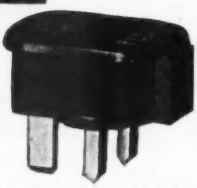

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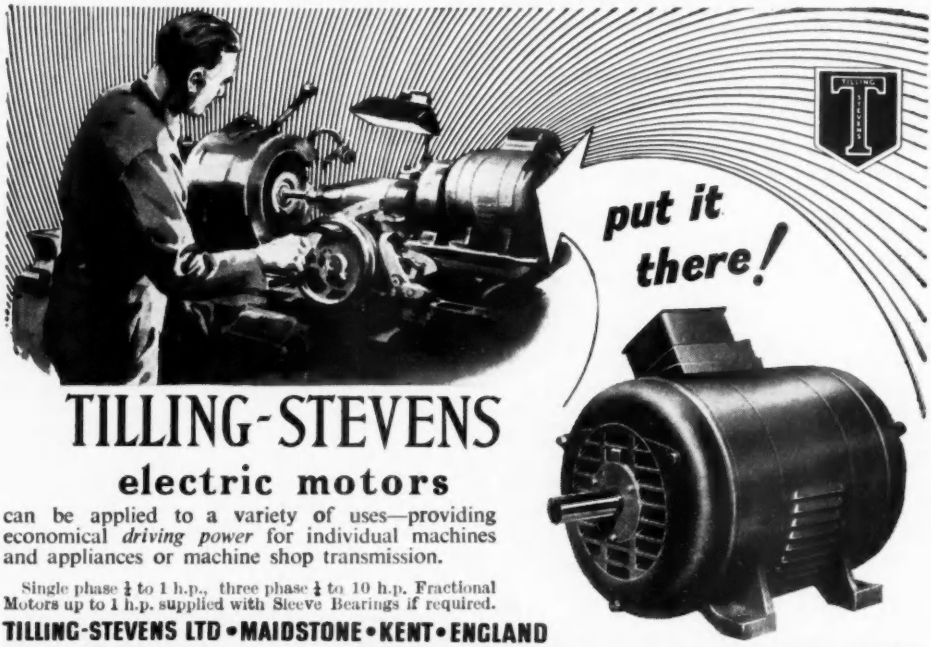


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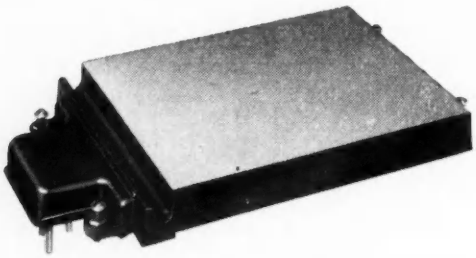

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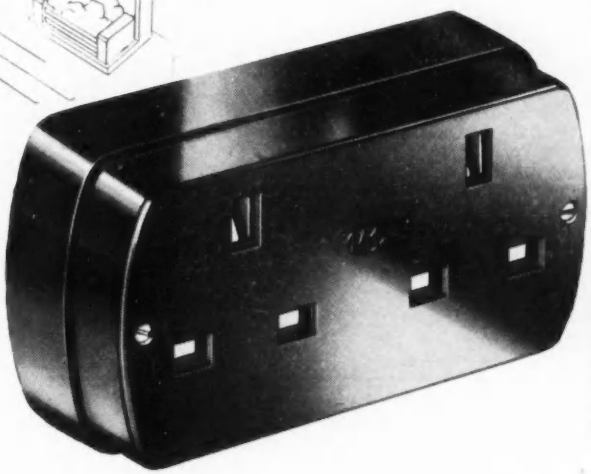

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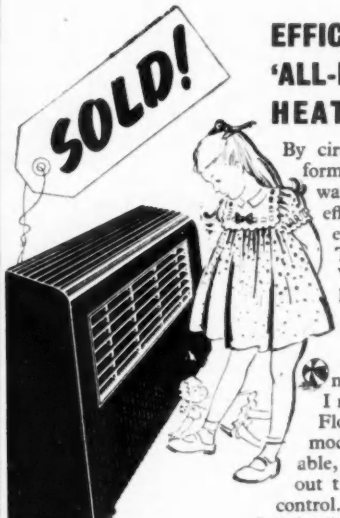


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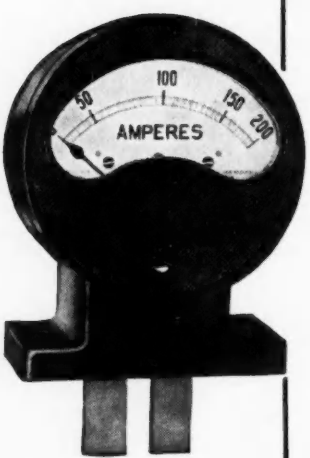


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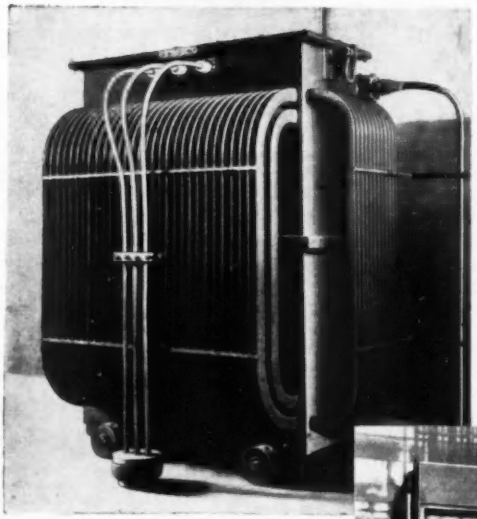

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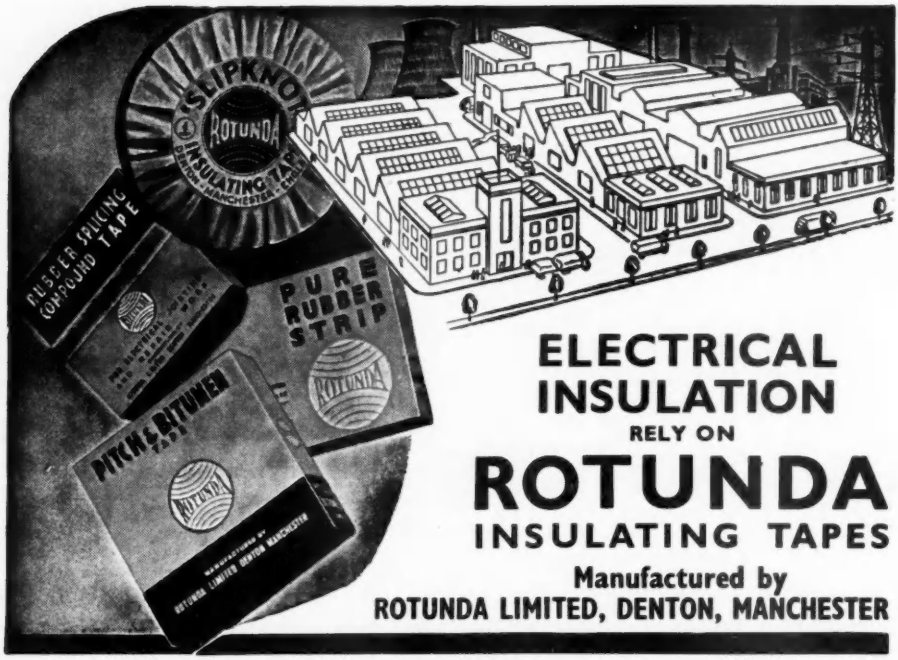


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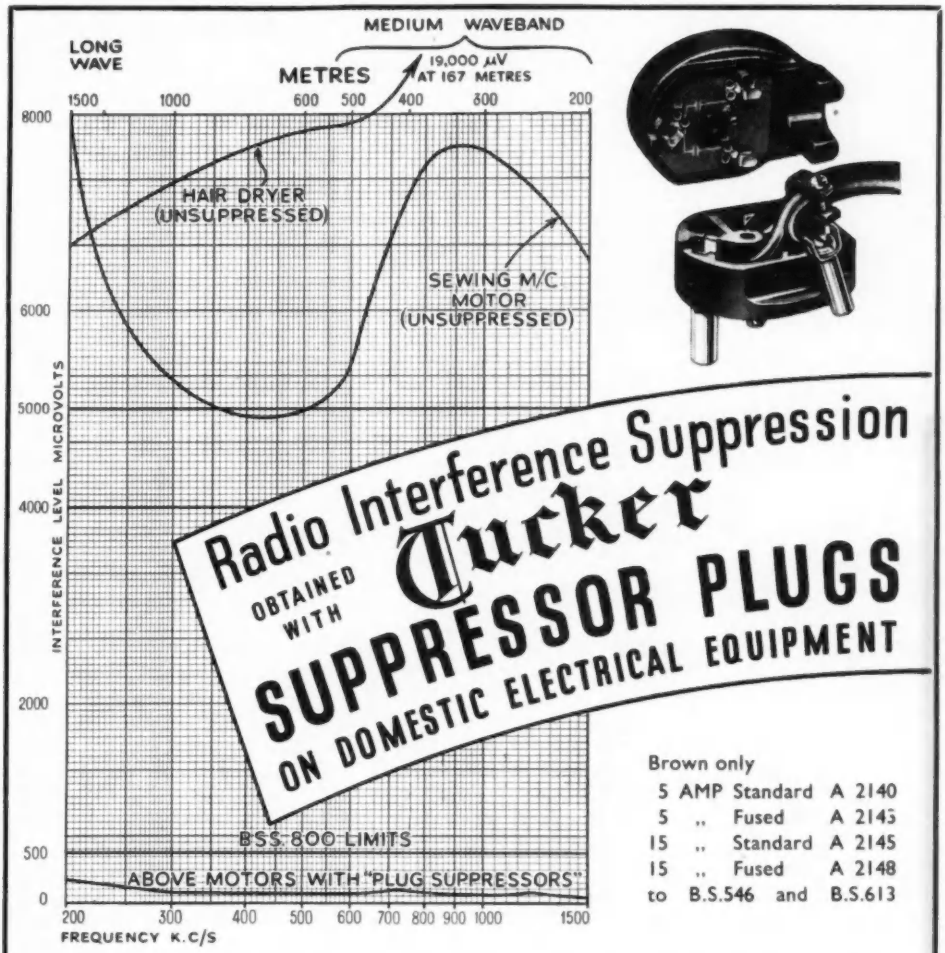




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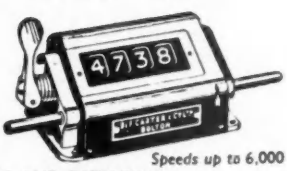


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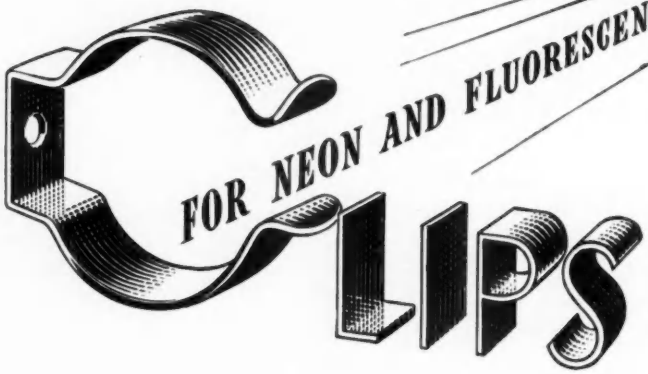

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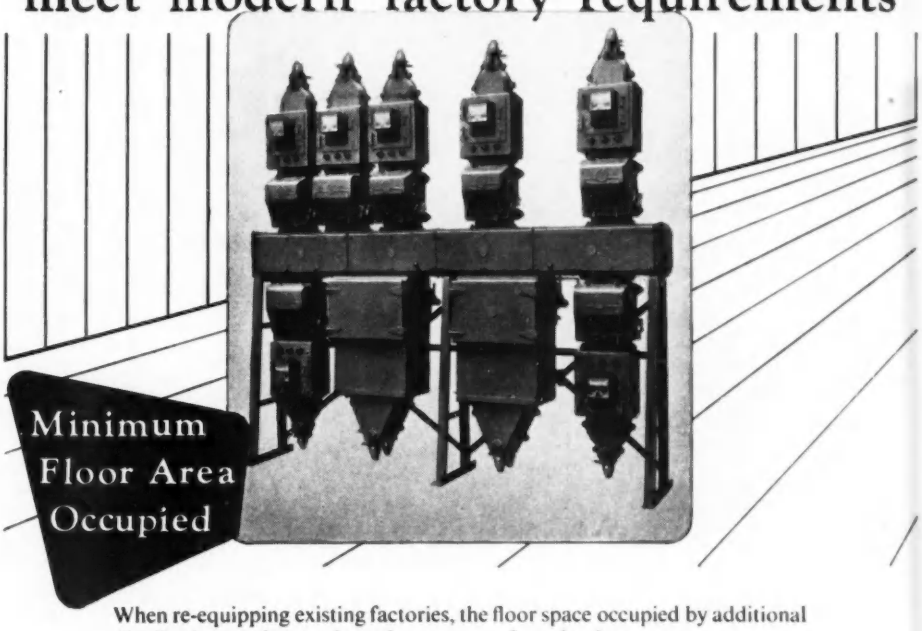


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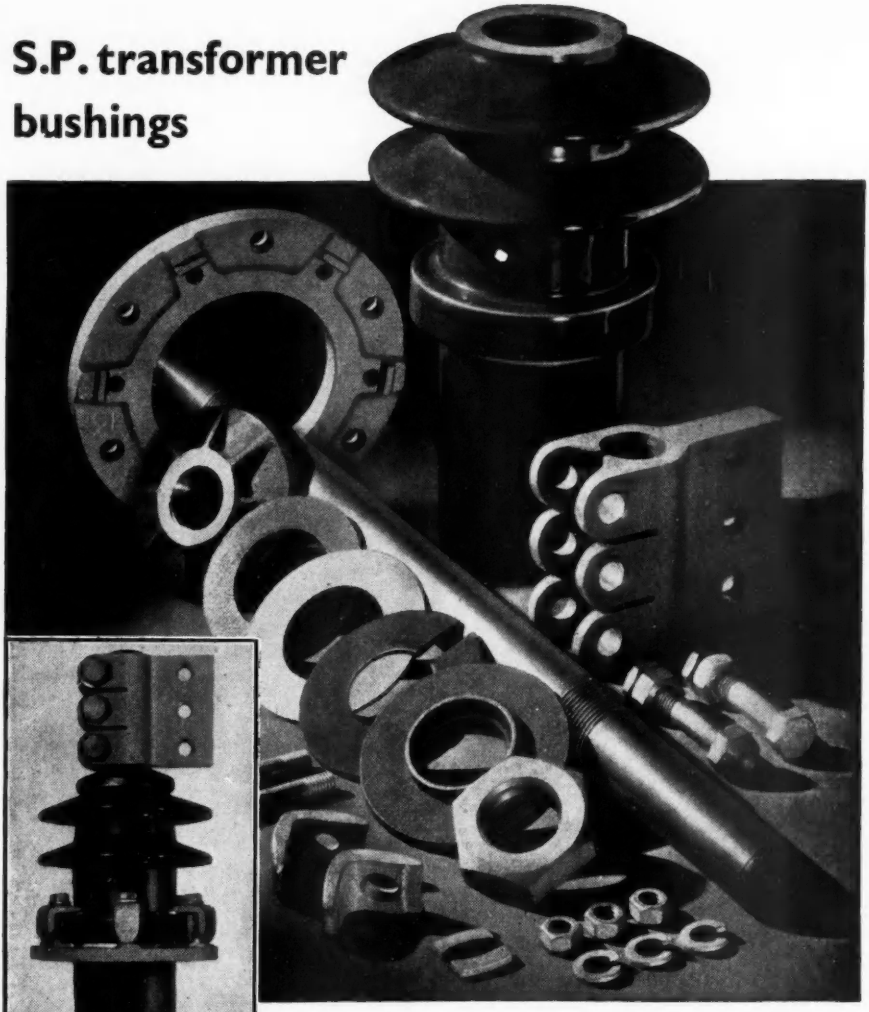

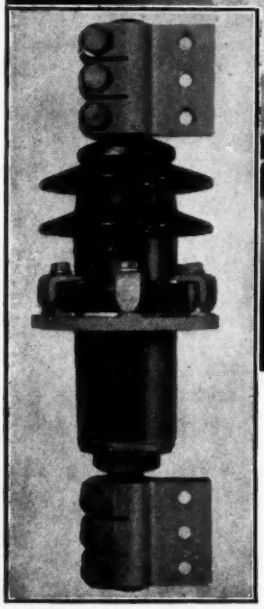

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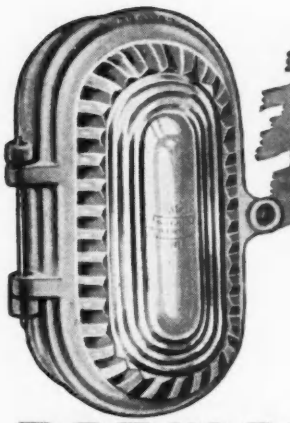

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